ADOPTION OF AGRISCIENCE CURRICULA: TEACHERS' AWARENESS, ATTITUDES AND PERCEPTIONS OF AGRICULTURAL LITERACY

By

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ADOPTION OF AGRISCIENCE CURRICULA: TEACHERS' AWARENESS, ATTITUDES AND PERCEPTIONS OF AGRICULTURAL LITERACY

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Many Americans have little understanding of the food and fiber system. The mission of agricultural education today is to increase awareness about this system. Developing agricultural literacy depends on the mainstream educational system and, in particular, on teachers' decisions about what to teach.

Depending on their knowledge and confidence, teachers are more or less willing and able to infuse agricultural topics into curricula. The challenge is to increase teacher recruitment, especially in urban and suburban areas, to Agriculture in the Classroom (AITC) workshops. These are designed to increase teachers' use of agriculturally-related curricula, provide access to curriculum resources, provide contact with supportive peers.

The Theory of Planned Behavior (TPB) was used to examine two groups of teachers, previous AITC workshop participants versus nonparticipants, and identify reasons why some participated and others did not. Relationships among TPB constructs suggest that previous workshop participants have strongly held attitudes surrounding their choices of future workshops. Nonparticipants, on the other hand, appear to be affected more by the opinions and authority of others, such as administrators, colleagues, and students' parents. Both groups were strongly influenced by the prospective payment of a stipend, because teachers expect compensation for costs associated with attending workshops. School level and location were significant demographic predictors, with high school teachers and urban/suburban teachers less likely to be participants. More teachers in urban areas and high school teachers also had less confidence in teaching agricultural education than those who taught in a rural school, had rural background or taught in an elementary school.

Given that many teachers are influenced by their administrators, AITC could target administrators to help promote agricultural education by emphasizing the benefits for students, the need to empower teachers to make decisions, and expressing support for teachers through a commitment to approve requests for attending AITC workshops. AITC also could involve successful teachers in promotional activities and messages. These teachers would be influential role models. Finally, many teachers have positive perceptions about biological, environmental and science topics. AITC needs to make the case that agriculture is a biological and environmental science in order to recruit science teachers.

CHAPTER 1
INTRODUCTION

America at its founding was an agrarian society. Over time, technology improved agricultural production, and the agricultural revolution made possible changes in society (Gardner, 2002). Societal changes occurred again with the industrial revolution which saw the rapid creation of jobs in other sectors, first in manufacturing and, in the twentieth century, in services and information.

Discovery of new ways to increase agricultural production output while decreasing inputs allowed only a small percentage (less than 2%) of the population to provide food for the entire population. Today's economy is based on knowledge and creativity, which have spurred further technological innovations in agriculture and many other fields and have become the true capital and premier wealth-producing resource (Drucker, 1989; 1992; Florida, 2002; Gardner, 2002).

Today's cities and their populations are more dependent than ever on productive agriculture, but the ties are invisible, masked by the proliferation of food products that are widely available. The mission of agricultural education today is to create an awareness of this progression as well as the need for production agriculture. Agricultural education also creates awareness about how newly developed technologies have become an integral part of the world's production of food and fiber.

Agricultural education creates agricultural literacy in youth in grades K-12. Agricultural literacy is defined as

> an understanding of the food and fiber system which includes its history and its current economic, social, and environmental significance to all Americans. This definition is purposely broad, and encompasses some knowledge of food and

> fiber production, processing, and domestic and international marketing. As a complement to instruction in other academic subjects, it also includes enough knowledge of nutrition to make informed personal choices about diet and health. Agriculturally literate people would have the practical knowledge needed to care for their outdoor environments, which include lawns, gardens, recreational areas, and parks. (National Research Council, 1988, p. 8-9)

The goal of agricultural literacy is to help citizens make informed choices as voters to support or oppose public policies on agricultural-related issues, such as genetically-modified organisms in food production, food safety, and on food security, environmental quality, and land use. Wright et al. (1994) highlight that public policy affecting agriculture and society is directly affected by societal goals. "These goals are being decided by people who have little knowledge about agriculture, how it relates to society and its economic and global significance to our nation" (p. 55).

Developing agricultural literacy, however, depends on the mainstream educational system and, in particular, on the awareness and attitudes of teachers as they make decisions about what and how to teach the future citizenry of the U.S. National, state, and local initiatives were created to incorporate instruction about the food and fiber system, its history, the role of science and technology, and the regional specificity of agriculture (Vaughn, 1993). The federal commitment was marked by the implementation of the 1990 Carl D. Perkins Vocational Education and Applied Technology Act Amendments (Thompson, 2000). Other projects with a focus on agricultural literacy have been funded by the National Science Foundation (NSF) and the U.S. Department of Education. More recently, the United States Department of Agriculture (USDA) initiated a competitive grants program to encourage increased enrollments in agriscience and agribusiness education programs in higher education. Those entering colleges and selecting majors can benefit from information about opportunities in agricultural careers (USDA, 2001).

These federal and state programs have invested money in major projects, including curriculum development and other educational resources. In order to provide an essential tools for educators to achieve agricultural literacy, national and state-specific curriculum materials have been created and provided to teachers for classroom use. For example, all the states, U.S. territories, and the District of Columbia have an Agriculture in the Classroom Program (USDA, 2001). USDA curriculum resources for elementary, secondary, high school, and college levels are found both in the literature and on numerous web sites (U. S. General Services Administration, 2003).

Given the emphasis on expanding agricultural education in mainstream programs, the focus must shift to teachers, the agents responsible for educating students. The majority of America's children know little about agriculture upon entering school and show little improvement in agricultural literacy by the time they graduate (National Research Council, 1988). If teachers of students in grades K-12 incorporated agricultural-related topics, they would gain the potential to educate and bring about desired changes (Hubert et al., 2000). There are, however, barriers to teachers adopting agricultural curricula, including mandatory curricula which leave little time for teachers to innovate, a lack of understanding how to include agricultural educational materials in mandatory curricula, and limited confidence to teach about agricultural concepts.

Thompson (2000) also notes the need for administrative support for agricultural education while cautioning that "there is little doubt that all levels of educational administration must support integrating academics" if educators are to successfully incorporate agricultural education (p. 223). Thompson (2001) continues the support for agriscience content alignment and integration as the key changes that will have to be made in Agricultural Education Programs to meet state standards.[1] Thompson further explained that it is key for the principals, administrators, science teachers, other teacher and parental supports to be made known for the agricultural program. Support for the program will increase by integrating more science.

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[1] Shelley-Tolbert et al. (2000, p. 52) define agriscience as "identifying and using concepts of biological, chemical, and physical science in the teaching of agriculture, and using examples to relate these concepts to the student."

Teacher education programs may or may not adequately prepare teachers to instruct agriculture as a science, or how to incorporate many agriscience concepts into their curriculum. Yet, there are still barriers and challenges facing agricultural education today. Thompson (2001) lists four dominant barriers: 1) lack of an integrated science curriculum, 2) lack of agriscience jobs in the local community, 3) lack of science teacher willingness to help integrate science concepts, and 4) lack of student preparation in science is a barrier to integrating science.

The process of mainstreaming to create agricultural literacy is widely supported by the agricultural industry, as well as the discipline of agricultural education (Budke, 1991; Connors & Elliot, 1994; Christian & Key, 1994; Hillison, 1996; National Research Council, 1988). Agricultural literacy can best be achieved through curriculum infusion in grades K-12. Curriculum infusion is the purposeful integration of agriculturally-related topics into the mandated curriculum in urban and suburban as well as rural schools. This is considered to be mainstreaming agri-science.[2] These topics are incorporated as natural interdisciplinary linkages. Teachers connect the natural sciences, mathematics, social and behavioral sciences to help students understand the world in which they live (Balschweid & Thompson, 2000).

With the recognition of the need for agricultural education and the subsequent development of educational resources, the emphasis has shifted to teacher education. Educators make decisions about what to include in their instruction and what teaching strategies to implement. Educators also can play a key role in making the final decisions about the content and curricula taught in their classrooms. Thus, agricultural education workshops can provide teachers the necessary knowledge base to deliver agriculture-related curricula in their classrooms. In Florida, for example, teacher workshops to promote agricultural education are offered all year. During the summer, an intensive three-day workshop is sponsored by the Florida Agriculture in the Classroom, Incorporated (FAITC) organization. Despite these efforts, the number of participants in FAITC workshops between 1999 and 2001 was limited. During the last year, teachers have many missed opportunities to participate in workshops sponsored by FAITC. Furthermore, a disproportionate number of the participants teach in rural areas. Consequently, it is not yet evident whether students from urban and rural areas can be equally interested in agriculture.

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[2] In general educational circles, mainstreaming always connotes inclusion of students with special needs into regular or "mainstream" educational settings. Agricultural educators, by contrast, use mainstreaming to refer to agricultural education curricula in urban and suburban schools.

Little is known, moreover, about teacher awareness, attitudes, and perceptions with respect to agricultural education. These are important factors because of the potential benefits for reaching those teachers who have ignored or missed teaching opportunities related to agricultural education. Ultimately, failure to reach urban and suburban teachers means program failure (Rossi et al., 1999). Thus, variable participation of equally recruited teachers becomes the critical issue.

Purpose

This study is to determine how attitudes, perceptions, and prior knowledge affect the likelihood of teacher participation in agricultural education workshops. To better understand the reasons behind teachers' decision-making and behavior, Ajzen's (1991) theory of planned behavior will be applied to the agricultural education context. This model has proven beneficial for understanding behavior in a variety of populations and contexts (Courneya et al., 1999). The theory emphasizes that a person's intention to perform a behavior is the dominant factor for determining that behavior. Likewise, intention is determined by the person's – in this case, the teacher's – attitudes, subjective norms, and perceived behavioral control. A mail survey of approximately 1,000 Florida teachers at levels K-12 was used to collect data for the study. The study will compare teachers who have attended one or more FAITC workshop with teachers who have chosen not to do so.

Objectives

This research is focused on identifying important teacher attributes, including attitudes, subjective norms, and perceived behavioral control, that affect the likelihood of participation in Florida Ag in the Classroom workshops. The research questions guiding this study are:

1. What are teachers' attitudes toward agricultural education?
2. What are teachers' perceptions of their competency to teach agricultural curriculum?
3. What elements of the Theory of Planned Behavior are significant predictors of intentions to participate in FAITC workshops?
4. What is the influence of teachers' prior knowledge about agriculture on their attitudes towards attending agricultural education workshops?
5. What demographic characteristics influence teachers' voluntary participation in workshops involving agricultural education?

Outline of the Study

This study is organized as follows: Chapter 2 presents the context for the study by describing the organization and operation of the Florida Agriculture in the Classroom (FAITC) program, as well as teacher reactions to FAITC workshops. Chapter 3 reviews the literature in education, agricultural education, and psychology that provides the conceptual foundation for this study. The chapter also reviews the theory of planned behavior (TPB) and sketches a framework for the comprehensive study of Florida teachers. Chapter 4 describes the methodology. Chapter 5 presents the findings from the application of TPB to FAITC workshop participation. Chapter 6 examines additional factors that impede or promote agricultural literacy in classrooms. Finally, Chapter 7 discusses the conclusions and recommendations that emerge from the analysis.

CHAPTER 2
FLORIDA AGRICULTURE IN THE CLASSROOM: MAKING AGRICULTURAL LITERACY ACCESSIBLE

Resurgence of interest in agricultural education occurred with the passage of the Smith-Hughes Act in 1917, when Federal money became available to support agricultural education programs (Hillison, 1998). By the time the *Second Annual Report of the Federal Board for Vocational Education* was published in 1918, every state had developed plans for agricultural education, teacher preparation, and teacher training programs (Hillison, 1998). However, the Smith-Hughes Act defined agricultural education as strictly vocational. With the assistance of the United States Department of Agriculture's printing of instructional publications for teachers, the agricultural education field also shifted increase emphasis on the academic and scientific aspects (Hillison, 1996). Agricultural and scientific concepts were taught in a way to make the subject matter relevant to students' lives, which through the 1940s were predominately rural throughout the United States (Hillison, 1998; 1999; Hubert et al., 2000).

In the 1950s, attention continued on how best to improve instruction in basic sciences, technical agriculture, and general and professional education courses (Hillison, 1998). In 1959, Hamlin forecast the future role of teacher educators, noting four general principles (as cited by Hillison, 1998):

> 1. Appropriate agricultural education should be provided for all Americans, not merely for farmers or workers in agricultural occupations.
>
> 2. Agricultural education should be provided in every unit of the public school system: elementary school, junior high school, senior high school, community college, technical institute, and adult division.
>
> 3. Agricultural education must find its place in a new comprehensive institution designed to provide education beyond the high school for those who do not belong in the four-year colleges and universities.

4. Long-term public policy for the development of public school education in agriculture must be evolved in the school districts, the states, and the nation.

By the 1980s, urban areas had greatly expanded, and social structures developed into the "New Society of Organizations" (Drucker, 1992). Agricultural organizations recognized that the general public was increasingly agriculturally illiterate (Hubert et al., 2000). In 1988, the National Research Council's Committee on Agricultural Education in Secondary Schools proposed a change to educate more Americans about agriculture's importance in America (National Research Council, 1988).

The need for societal knowledge about agriculture is grounded on two primary reasons. First, people need to understand basic principles of food and fiber production to become more informed consumers. Second, as citizens contribute in making policy decisions, they need to understand agriculture's impact on society, the economy, and the environment (Hubert et al., 2000). One of the major recommendations of the National Research Council study was that "Beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture" (p. 2).

The key to appreciating the need for agriculture is understanding that the agricultural revolution made possible the development of cities – that is, the gathering and settling of large groups of people in specific places over a long period of time (Keating, 1996). Changes in societal functioning were made possible by discoveries of new means of increasing production output while at the same time decreasing the amount of input. "With one-third the labor committed to agricultural production as was the case in 1900, America now produces seven times the farm output" (Gardner, 2002, p. 2). While production agriculture involves few people, a much larger number process, distribute, and market the products. Only a small percentage of the population is needed to sustain agricultural production, which allowed for the development of the division of labor in industrial and, later, the information societies.

The underpinning of the success of the agricultural industry has been technological progress across four main fronts: 1) mechanical, such as the tractor, combine, pasteurization, and refrigeration; 2) biological, such as hybrids of corn, wheat and rice; 3) chemical, such as synthetic fertilizers, agrochemical pesticides, and food preservatives; and 4) managerial, such as specialized production, division of labor, and size and scale economies (Gardner, 2002; Marshall & Tucker, 1992). Education has been a major component of processes to bring about changes in attitudes and behaviors, as well as the adoption of innovations (Rogers, 1995).

With the renewed national focus on agricultural education, there has been no shortage of suggestions for K-12 teachers. Thematic learning is one way to structure strategies to teach for learning through all modalities by creating cognitive connections. This approach has a central rationale – namely, that all learning is connected in some way and that the learning process is driven by group interactions (Hewit & Whittier, 1997; Jacobs & Borland, 1986; Senge, 1990). Ellis & Fouts (1993) posit that an interdisciplinary approach acknowledges the natural relationships between subject areas that are traditionally segregated. This view suggests that the best way to promote agricultural literacy is by infusing agricultural-related topics into the curricula of established disciplines (Everett, 1985; Budke, 1991; Christian & Key, 1994; Hillison, 1996). This widespread support for infusion depends on teachers' awareness of agricultural content. Programs such as Agriculture in the Classroom strive to heighten that awareness and use.

Agriculture in the Classroom

The USDA established the Agriculture in the Classroom program in 1981 to provide curriculum materials to enhance agricultural literacy. Every U.S. state, and territory and the District of Columbia has such a program. The national Agriculture in the Classroom program is endorsed by every living former Secretary of Agriculture, the National Association of State Departments of Agriculture, the National Conference of States Legislatures, most state

Governors, and the major agricultural organizations and commodity groups (USDA, 2002). There is an Agriculture in the Classroom (AITC) organization in every state, even though states may have formed organizations differently. Some state organizations have educational nonprofit agencies, while others have re-assigned government personnel to lead AITC efforts.

Agriculture in the Classroom programs share the same mission and vision. Their goal is to help students gain a greater awareness of the importance of agriculture in the economy and society so that they may become citizens supportive of responsible agricultural policies. Because less than 2% of the American population is involved in farming, people's lives have become disconnected from food and farming. Currently, the majority of children grow up in cities and suburbs having no opportunities to understand farming as a way of life. Children are generally unaware of the scientifically sophisticated, technological intensive farming practices used by today's agricultural producers. They do not fully understand the food and fiber system links that connect consumers with producers.

The AITC program materials have been created for teaching math, science, language skills, art, geography, history, and environmental sciences. Many states have budgeted funds to develop educational materials for teachers that can be used to meet state-mandated learning standards. Other funds come from within each group of state supporters. For example, Florida's agricultural license tag program is the primary source of funding for the FAITC program.

Florida Agriculture in the Classroom (FAITC)

FAITC was established in 1986 to encourage more agricultural content in curricula, and to re-situate the previous agricultural curricula with new agriscience curricula (Connors & Elliott, 1994; Hubert et al., 2000). Its mission is "to develop an understanding of our multi-faceted agricultural system and its relationship to our economy, environment, health and quality of life" (www.florida-agriculture.com).

The FAITC organization is guided by a board of directors who represent the Florida Department of Education, agricultural commodity groups, the Florida Farm Bureau, the Florida Department of Agriculture and Consumer Services, and the College of Agriculture and Life Sciences at the University of Florida. FAITC is managed by an executive director and is housed on the campus of the University of Florida, where it also employs several part-time students. In 2002, an education coordinator was added to the staff.

Teachers can access relevant agriculturally-related curricular materials through the FAITC outreach activities. The Florida Agriculture in the Classroom program delivers curricula through three-day state teacher workshops, one-day local workshops, web site on-line ordering, mail order forms, county programs working with volunteers and Florida Cooperative Extension Service (FCES) personnel, and a tabloid developed for fourth grade students. These services and materials are provided free of charge.

FAITC developed two curricula: Keeping Florida Green (KFG), a 6-8 curriculum, and Food, Land and People (FLP), a curriculum for grades Pre-K-12. These curricula include some common elements based on teaching an awareness that agriculture provides food, clothing, and shelter. The lessons are meant to reinforce knowledge of the agro-food system in order to continue the availability of a safe and abundant supply of food and fiber in America. The special focus in Food, Land, and People is to recognize the interdependence of agriculture, the environment, and human needs. It aims to promote greater agricultural literacy with regard to consumer choices and sustainable agricultural practices. Many of the lessons incorporate problem-solving and critical-thinking skills. Food, Land and People also is designed to complement existing agricultural and environmental education programs such as 4-H and FFA. The educational materials were prepared independently by teacher volunteers recruited at FAITC workshops. These were reviewed by other volunteer teachers for technical accuracy and capacity to fit into the mandated curricula.

In Florida and in states across the country, the educational focus has been on mastering reading and math skills. This focus has led to pressure to show that students are proficient in these subjects. Standardized test are used to measure performance and the results are now tied to school funding and teacher salaries. Because the dominant skill areas tested in the Florida Comprehensive Achievement Test (FCAT) are reading, language, and mathematics, these areas determine a school's "grade" and its level of state funding. However, in the Florida Department of Education's standards, agricultural content per se is not included or tested. The national and state support for increased agricultural literacy for all students has little connection with the content that is taught and tested in Florida. The FAITC program has identified and published curricular connections between the state's "Sunshine State Standards" and the lessons included in its Keeping Florida Green and Food, Land, and People curricula. Each lesson has connections to some or all of the core subject areas of language arts, mathematics, science, social studies, the arts, and health and physical education. However, only language arts, mathematics, and science are tested.

Teacher Participation

In 2001, a state-wide conference and 25 county workshops were conducted. The county workshops are detailed in Table 2.1, including with information on type of curriculum taught and the number of participants are included. The FAITC program has covered about 22% of the number of the state's counties and reached 439 (.8%) of the teachers in those counties. Though coverage of the target audience might appear low, the FAITC staff and operating budget were insufficient to reach many more teachers that year (or in preceding or subsequent years). Given that a workshop was designed to train 25 to 30 teachers (Cannon, 2003), approximately 60 percent of the program's capacity was subscribed for the year.

Follow-up of the workshop experience and teacher implementation of the curriculum has been limited to information about teachers attendance at workshops or access of information from FAITC. All who attend workshops receive information about upcoming programs, grant opportunities, Excellence in Teaching about Agriculture Award nomination forms, and new resources. Teacher consultants who reviewed the curricular materials believed that the state-mandated teaching standards could be covered by using the curriculum suggested by FAITC-prepared curricula (www.florida-agriculture.com).

Assessment of FAITC Impacts

During 2000-2001, teachers who participated in the state-wide teacher workshop in June 2000 were involved in a study to assess program impact. The evaluation provided the foundation for the following data and analysis about FAITC's operations and outcomes. The study of the teacher training workshops included a questionnaire administered to all 96 participants in the workshop. The survey addressed three principal issues: (1) whether agricultural topics would motivate their students, (2) whether FAITC curricula would be useful, and (3) if the curricula fit into that mandated for teachers. Seventy-five teachers provided useable data (a response rate of 78%). When asked if the curriculum would be useful and if it fit into their mandated curriculum, the teachers were generally positive. When the teachers were asked if they believed these topics would motivate their students, most who teach students from rural areas agreed or strongly agreed that the topics would motivate their students but many urban and suburban-based teachers did not.

To attempt to undo the stereotypical view – that only rural kids are interested in agricultural topics – FAITC seeks to gain formal curricula approvals and it has also initiated curriculum adoption incentives. Even though the workshops have varied over the last four years, the two major curricula, KFG and FLP, are the standard teaching resources that have been used. The responses about student motivation were related to the same teaching materials.

Do teachers actually use or implement agriculturally-related materials in their classrooms? The degree of implementation refers to the ways in which FAITC and the national AITC have created methods to encourage teachers of all grades, K-12, to use curricula related to agriculture to create student awareness of and appreciation for agriculture. FAITC has sponsored presentation of these materials through three-day state teacher workshops and other one-day workshops to increase teacher confidence, knowledge, skills, and attitudes towards agriculturally-related topics. Through use of the curricula, FAITC hopes to create positive student attitudes and awareness of and interest in potential agricultural career options. However, barriers to adopting and implementing new curricula must be overcome. One barrier is the recruitment of more urban and suburban teachers to FAITC workshops. Roughly 64% of workshop attendees were from urban and suburban areas, where 93% of Florida's population lives, whereas 36% of the attendees represented Florida's 7% rural population. It appears that reaching a more representative cross-section of the state's teachers is necessary in order to more fully achieve FAITC's mission.

Further information was provided by FAITC workshop participants through in-depth telephone interviews with 17 teachers. They were asked what they liked about FAITC workshops and curricula and about how they have used or modified the curricula. Those who had not used FAITC materials were asked why they had not done so. Teachers also were asked about professional pressures that they felt and what they would recommend to encourage more teacher participation from mainstream K-12 educators.[1]

Teachers indicated that they liked the FAITC materials. The majority of the teachers said that their own confidence and comfort level with agricultural topics increased by using agriscience learning activities to infuse agriscience into their curriculum policies. The curricula includes participatory lessons that encourage experiential learning in the classroom. All the interviewees liked the curricular materials for the comprehensive background information provided for teachers' use in preparing lessons. There are participatory – that is, hands-on – interactive parts of every lesson for students. The interactive strategies helped teachers reach students with different learning styles.

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[1] The in-depth interviews were coded and organized into themes or domains that represent responses common to several participants, using constant comparative methods (Spradley, 1979).

Teachers indicated that they used curricular materials in many ways. Certain lessons appealed to teachers on an individual basis. They approved of the variety of topics and lessons from which to choose and found that many lessons fit well with current required curricula. Several teachers agreed with the statement that, "The materials actually helped me use discovery learning with the students. . . . The curriculum fills a niche in action-based learning activities." Furthermore, teachers agreed that students became very interested in the topics related to agriculture. One teacher commented, "Kids start to understand that food doesn't really come from the grocery store or from snack machines."

After using the curricular materials, teachers noted that students like all the materials, enjoy the lessons' participatory aspects, and can relate to and identify with the curriculum. Following positive reactions and responses from their students after using lessons the first couple of times, teachers tend to use the materials more often. Interviewees also indicated that their own decisions of what to teach were often based on whether their students would enjoy the learning strategies and lessons. Teachers also faced a number of external influences, including authority figures (e.g., principals and curriculum coordinators), legal requirements (e.g., re-certification and mandatory student testing), and monetary incentives to participate in workshops.

Questions asked of teachers in the impact evaluation study interviews related to adopting or using the materials provided for their classrooms. In their responses, teachers referred to past experiences for their concerns about the FAITC curricula and implementation. Along with FCAT pressure faced by all teachers in the state of Florida, other contextual factors created potential barriers to curriculum adoption. Even though these were present to some degree for each participant's situation, they overcame these barriers and participate in FAITC workshops.

From the small sample of teacher interviews, several explanations emerged to explain why teachers did not use the curricula. Some teachers felt that they were not free to use the materials because they were required to teach mandated lessons monitored by administrators. Some teachers said that they had to find ways to make their lesson plans meet grade-level expectations. Others indicated that agriculture does not seem to fit their clientele. As one teacher said, “The most ag you’ll see here in our town is shrubs, trees, and golf greens, so this doesn’t relate here.” Most of the other teachers who did not use the FAITC curricula referred to meeting state standards based on the emphasis of reading, math, writing, and language arts. One teacher noted that it is especially hard for new teachers to use the materials because “the novice teachers haven’t learned how to integrate across curricular materials yet.”

Agricultural Literacy Depends on Educators’ Involvement

The information gained from the evaluation survey and in-depth interviews provides the foundation for this dissertation study. The knowledge gained from the study confirmed that barriers exist to accessing and implementing the FAITC materials. Four main categories of concerns were expressed by workshop participants: 1) *involvement* on the part of the teachers; 2) *curriculum approvals* necessary for teachers to meet state mandates and have appropriate sanctions for using or infusing the curriculum in their classrooms; 3) *teacher perceptions* related to whether or not agricultural topics motivate their students; and 4) *degrees of implementation* whereby teachers are encouraged and given incentives to use agriculturally related curricula with their students.

Involvement strategies during the workshops were originally designed to familiarize teachers with the materials, lessons, and concepts. The involvement strategies have now been fine-tuned to include participatory lesson and unit planning in collaborative groups. These strategies were created by teachers who must also work within the context of Florida’s Sunshine State Standards to fit in their curricula with mandated curricula and to work with formats closely aligned with the Florida Comprehensive Achievement Test (FCAT). Availability of approved curricula and high-stakes testing pressures influence teacher involvement and use of FAITC curricula. Finally, approval of FAITC curricula, such as KFG, is not done at the state level. Rather, it the responsibility of each Florida school district. The goal of the FAITC board of directors is to gain approval of the FAITC curricula in the most populous school districts –

Miami-Dade, Duval, and Hillsborough Counties – in the expectation that smaller districts will follow the lead of the larger districts.

This chapter has described the organization and operation of FAITC. Though FAITC has implemented a number of initiatives, participation of teachers, especially those working in urban and suburban areas, has been problematic. Interviews with participating teachers uncovered the need to better understand the decision-making process for attending FAITC workshops. The next chapter reviews the literatures in education and psychology on curriculum foundations and on the Theory of Planned Behavior (TPB). The TPB model to predict teacher participation is then developed.

Table 2.1 FAITC Curriculum Workshops for Fiscal Year 2001

County	Date	Workshop Curriculum *Food, Land, and People (FLP) or Keeping Florida Green (KFG)*	Number of Partici-pants	Percentage of Teachers in County	Grade level of Teacher Participants
Alachua	11/19	FLP	17	1.6% of 1,355	1-6
Brevard	9/17	KFG	7	.2% of 3,248	K-12
Broward	10/13	FLP	25	.2% of 10,145	K-12
Clay	2/16	FLP	10	.7% of 1,373	1-5
Collier	7/19	FLP/KFG	15	.9% of 1,648	K-12
Dade	9/24	FLP	20	.3% of 14,532	K-12
	10/19	FLP	20		K-12
Highlands	8/01	FLP	16	3.1% of 508	PreK-8
Hillsborough	10/13	FLP	14	.6% of 7,523	K-12
	10/19	FLP	30		K-12
Madison	10/12	FLP	21	14.5% of 145	PreK-8
Marion	6/14	FLP	14	.7% of 1,942	6-8
Martin	10/19	KFG	30	4.0% of 745	K-12
Orange	6/21	FLP	25	1.7% of 6,525	K-5
	6/22	KFG	10		6-8
	8/01	FLP	15		K-5
	8/02	FLP	17		K-5
	8/03	KFG	1		K-5
	10/10	FLP	46		K-5
Polk	7/23	KFG	10	.6% of 3,939	2-12
	10/09	FLP	3		K-8
	11/06	KFG	10		6-8
Sarasota	1/27	KFG	30	2.7% of 1,593	K-6
	7/24	FLP	13		K-12
Sumter	11/27	FLP	20	7.5% of 265	K-12
Total	25	FLP 18; KFG 8	439 (15 of 67 counties)	.8% of 55,486	

CHAPTER 3

THE THEORY OF PLANNED BEHAVIOR AS A MEANS TO UNDERSTAND ADOPTION OF NEW CURRICULA: A REVIEW OF THE LITERATURE

Teachers' awareness, attitudes, and perceptions can greatly affect their choices of which curricula to use in their classrooms. This is a particular problem for agricultural education because the majority of America's schools and teachers are found in cities and suburbs, not rural areas. Infusion, the integration of agriculturally-related topics with other mandated curricula, is the strategy recommended to increase agricultural literacy (Thompson & Balschweid, 2000; Conroy & Kelsey, 2000; National Research Council, 1988; Trexler & Suvedi, 1998; Trexler et al., 2000). Theories of attitudes and behaviors can be used to understand what teachers teach and why. The theory of planned behavior, for example, is a framework that accounts for change in awareness, attitudes, and perceptions.

The role of teachers' awareness, attitudes, and perceptions about agricultural education include the traditional conceptualization of agricultural literacy, with its focus on vocational agricultural education. Teachers' perceptions about agricultural literacy also need to encompass contemporary scientific advances which broaden its scope as a multi-disciplinary field. Thus, agricultural literacy should include an understanding the differences among agricultural education, vocational agricultural education, and agriscience. Depending on their knowledge and confidence, teachers are able to infuse agricultural education topics into existing curricula. The main challenge is to to increase teacher recruitment, especially among those in urban areas, to Agriculture in the Classroom workshops. Doing so will (a) increase teachers' agricultural awareness, (b) provide access to curriculum resources, (c) provide contacts with supportive peers, and, thereby (d) influence decisions to use agriculturally-related curricula.

The literature review in this chapter is divided into five sections: 1) educational philosophies about knowledge acquisition; 2) strategies used to increase inclusion of agricultural curricula by teachers; 3) the theory of planned behavior; 4) attitude-behavior relations interconnected with awareness, attitudes, and perceptions; and 5) applications of the theory to teachers' participation in Florida Ag in the Classroom workshops.

Educational Philosophies of Knowledge Acquisition

Two major philosophical perspectives about learning have dominated educational thought and practice: *objectivism* and *constructivism* (Byrnes, 1996; Darling-Hammond & Sclan, 1996; Bybee, 1993; Shapiro, 1994). The objectivist perspective is based on the belief that knowledge is transferred directly to the learner and that relationships between ideas and concepts can be immediately seen by all students (Byrnes, 1996). The objectivist perspective is founded in the behavioral view of teaching and learning. It is built on the premise that reality exists separately from the learner and can be revealed by the methodical discovery of verifiable facts (Byrnes, 1996; Shapiro, 1994; Oakes & Lipton, 1999). Historically, objectivism has been favored by educators and administrators because it can be readily standardized and "learning" can be measured for purposes of accountability (Darling-Hammond & Sclan, 1996; Oakes & Lipton, 1999; Shapiro, 1994). The interest in accountability is once again at the forefront, as seen in the upswing of requirements for mandatory testing and evaluation.

In the classroom, objectivism takes the form of a teacher – a possessor of knowledge – passing that knowledge on to students – potential recipients of that knowledge – using standardized content, sequences, and strategies (Darling-Hammond & Sclan, 1996; Zemelman et al., 1998). In this view, the learner produces learning outcomes and becomes educated by having learned a set of predetermined facts (Shapiro, 1996). Standardized tests are the common instruments used to evaluate whether learning has occurred. Clearly, this one-size-fits-all style of teaching might not be equally effective for all potential learners in a diverse society (Darling-Hammond & Sclan, 1996).

Constructivism is based on a different set of assumptions about teaching and learning. In contrast to objectivism, constructivism assumes that individuals interpret new knowledge uniquely (Byrnes, 1996; Darling-Hammond & Sclan, 1996; Oakes & Lipton, 1999; Shapiro, 1994). This perspective, built on the view that knowledge is a construction of the human mind, poses teachers as facilitators for their students' learning. It also posits that a student's interpretation is mediated by preexisting knowledge and experience. Constructivist theory calls for a pedagogy that engages learners to develop, reshape, and expand understanding (Lee, 2003).

The objectivist approach, with the direct transmission of knowledge from teacher to student (Figure 3.1a) contrasts with the hands-on, experiential learning environment of the constructivist approach (Figure 3.1b). In the latter, the teacher stands outside the learning environment rather than representing its embodiment. Students' learning environments also include the historical and technological context, as well as their personal experiences. Constructivist teachers provide multiple approaches in the learning environment for diverse learning styles.

Since the mid-1980s, the constructivist approach has been widely accepted and advocated as the preferred paradigm for teaching strategies, learning theories, and content pedagogy among leading educators in schools of education (Byrnes, 1996; Darling-Hammond & Sclan, 1996). The approach has long-standing support from Dewey (1938) and Piaget (Phillips, 1981), who endorsed an experiential orientation in which teachers create an environment to provide participatory learning (Mabie & Baker, 1996). Dewey believed that "there is an intimate and necessary relation between the processes of actual experience and education" (Dewey, 1938, p. 20).

Howard Gardner's (1983, 1993) and Robert Sternberg's (1986, 1988, 1997) theories on human intelligences advance the work begun by Dewey and Piaget. Both Gardner and Sternberg have identified specific ways to explain how humans learn. For educators to achieve optimal results, they need to teach in a way that best helps all students learn. Gardner's work helps identify specific learning styles whereby individuals process new information, particularly through one method. Sternberg's work on multiple intelligences has specifically recognized individual learner strengths and weaknesses. To better understand how these theories relate to the kinds of teaching strategies embodied in Florida Agriculture in the Classroom curricular materials, a brief discussion of each follows.

Gardner's (1983) theory of multiple intelligences broadened the traditional concept from the recognition of verbal and quantitative skills to include a list of eight intelligences. Gardner defined eight intelligences as: 1) logical-mathematical, which includes logical thinking and deductive reasoning especially associated with science and math; 2) linguistic intelligence, not only to possess a mastery of language but to be able to use language to express one's self in various formats and remember information; 3) spatial intelligence, involving the ability to create mental images to solve problems; 4) musical intelligence, which incorporates the capability to identify and compose musical tonalities, pitches, and rhythms; 5) bodily-kinesthetic intelligence, or the ability to create and use mental abilities to coordinate bodily movements that connect mental and physical activity; 6) personal intelligence, which includes interpersonal feelings – that is, to know the feelings and intentions of others; and 7) intra-personal intelligence, the ability to understand one's own feelings. An eighth intelligence, naturalistic intelligence, was added by Garner (1993).

Gardner explains that each individual has all eight types of intelligence and that each child in a classroom will have his or her own unique set of intellectual strengths. The set of strategies that best facilitates a student's learning is not a "one-size-fits-all" pattern. These areas of strength are commonly referred to as learning styles (Gardner, 1983, 1993). Implications for teachers can be profound because Gardner's theories put more responsibility on educators to acknowledge and structure teaching to reach a broader range of talents and skills.

It would be impossible for a classroom teacher to design every lesson to accommodate the learning style of each student. Gardner's theory explains, however, that children may possess specific advanced cognitive abilities while not possessing an adeptness at learning from every possible style. Awareness of these unique learning styles allows teachers to implement a comprehensive set of strategies in order to encourage successful understanding of the content taught (Brualdi, 1996).

Sternberg (1988) proposed a triarchic theory of intelligence that consists of the analytical, creative, and practical knowledge and skills as the core elements of worthwhile learning. Worthwhile learning also is important to intellectual capability. In Sternberg's theory, the concept of intelligence is equated with combinations of preferences from three levels of self-management. These levels are: 1) functions of governments of the mind; 2) stylistic preferences; and 3) forms of mental self-government. Each element is defined by an individual's cognitive functions in combination with his or her analytical skills, creative thinking, and practical knowledge. Collaborative functions of the internal mental framework, the external world (that is, past experiences with teachers, parents, and peers) and emergent social interactions determine individual learning (p. 73).

The significance of the contemporary theories is three-fold: 1) each is multi-faceted to explain differences among learners; 2) each suggests implementing various instructional methods to meet various learning styles; and 3) each supports Dewey's (1938) and Piaget's (1960) work. The constructivist approach to successful learning implies that Florida Ag in the Classroom (FAITC) needs to design its curricula and resources to support these pedagogically sound methods (e.g., direct instruction, active participation, role modeling, and learner-centered teaching).

Research on learning theory and constructivism concludes, therefore, that teachers' fundamental beliefs about learning are dominant. The constructivist perspective supports those who want to integrate agricultural concepts in their standardized curricula. It also supports those who choose to implement the kinds of learning activities and teaching strategies that are offered by current infusion and mainstream approaches to agricultural education.

Certain teachers are more likely to be constructivists in their classrooms. Teachers who are familiar with infusion and the benefits from drawing on multiple disciplines, and who can make these connections visible for their students while they accomplish mandated instructional goals, tend to be constructivist in their teaching. Teachers most likely to be able to teach in this holistic fashion are those with advanced academic degrees and/or greater teaching experience (Hewit & Whittier, 1997; National Science Resources Center, 1997). Moreover, teachers with advanced degrees will likely have received educational updates pertaining to the implementation of new teaching and learning strategies, such as curricular infusion and constructivist learning theories. Teachers current in teaching and learning philosophies also tend to mentor student interns.

Strategies to Increase Inclusion of Agricultural Curricula

The growing initiative to mainstream agricultural literacy resonates with constructivism, but it does so implicitly. Agricultural educators are "doers" based upon the "learning by doing" philosophy, says Knoblach (2000, p. 6), and the outdoor learning environments of agricultural education are perfect examples of the constructivist perspective even if they are not identified as such. However, this approach generally has not been an outcome of adherence to an educational philosophy.

Agricultural education is part of the national agenda (Hillison, 1996), but it is faced with a lack of teachers' awareness, confidence, and understanding of which agricultural topics to include in their curricula and how to include them (National Research Council, 1988; Hubert et al., 2000). The National Research Council (1988) coined the term "agricultural literacy" and suggested that the most pragmatic way to include agriculture in elementary school curricula would be through teaching science. Concomitant to the redefined audience for agricultural literacy, the American Association for the Advancement of Science (1989) called for increased science literacy across traditional subject boundaries to promote more emphasis on the interconnectedness among disciplines. In addition, the creation of the National Steering Committee for Reinventing Agricultural Education for the Year 2020 (National Council for

Agricultural Education, 2000) is an intensive effort to position agricultural education in American schools. Four goals are established by the program.

> Goal 1: An abundance of highly motivating, well-educated teachers in all disciplines, pre-kindergarten through adult, to provide agriculture, food, fiber and natural resources systems education.
>
> Goal 2: All students have access to seamless, lifelong instruction in agriculture, food, fiber, and natural resources systems through a wide variety of delivery systems and educational settings.
>
> Goal 3: All students are conversationally literate in agriculture, food, fiber and natural resources systems.
>
> Goal 4: Partnerships and strategic alliances ensure a continuous presence of education in and about agriculture, food, fiber, and natural resources systems.

Objectives to attain these goals involve preparing all teachers to include agricultural content in a relevant, integrated instructional approach (National Council for Agricultural Education, 1996). Agricultural educators have developed different curricular programs, models, and methods to promote agricultural literacy (Kelly, 2000; Stasz et al., 1994).

Recent recommendations concerning agriculture in the K-12 curriculum have incorporated constructivism. These recommendations include (1) curriculum development, (2) infusion processes to established sciences, and (3) providing pre-service programs on how to infuse curricula related to agricultural sciences. Science teachers and specialists work to develop curricula and instructional materials in order to give students a knowledge base in human ecology and the agro-food system. Bybee (1993) recommended that the National Science Teachers Association develop and disseminate curriculum materials that teach science through agriculture. Educators also are encouraged to integrate agriculture in the curriculum. Finally, pre-service teacher education should includes topics related to agricultural literacy (National Research Council, 1988; Connors & Elliot, 1994; Hubert, 2000).

Several new programs, models, and methods are based upon the dominant philosophical paradigm to "learn by doing" (Knobloch, 2000). For example, Hartzell et al. (1996) suggest a strategy for preparing teachers to integrate academic and vocational education. Mabie and Baker (1996) compared the implementation of science process skills with and without agriculturally-oriented projects and found that agriculturally-oriented teaching of urban elementary students is associated with higher levels of science content attainment. Mabie and Baker's (1996) work is based on Dewey (1938) and Piaget (1960) and emphasizes experiential learning. The *National Science Education Standards* (National Research Council, 1995) reflect the emphasis on strategies that promote the best teaching practices that utilize experiential learning. Acker (2000, p. 9) suggests that "few subjects excite students the way that live animals, growing plants, and business experiences motivate students in agriculture classes."

In Illinois, two science curriculum models designed to provide content integration and participatory learning – Biological Science Application in Agriculture (BSAA) and Physical Science Applications in Agriculture (PSAA) – were each found effective at integrating agriculture into science curriculum (Osborne & Dyer, 1998). In addition, secondary school principals in Oregon, where content integration was delivered through the "Agricultural Science and Technology" program, agreed that "administrator, science teacher, other teacher support, and parental support for agricultural programs will increase by integrating more science" (Thompson, 2000:232). Other studies of teachers' perceptions of and preparation for curriculum integration of agricultural educational topics have shown that teachers make curriculum adoptions when free choices are permitted (Connors & Elliot, 1994; Deeds et al., 1991; Harris & Birkenholz, 1996; Thompson & Balschweid, 2000). However, more strategies are needed to promote the integration of agricultural concepts and illustrations into other courses. There is increased attention to providing curricula, emphasizing how teachers can best implement the curricula to enhance agricultural literacy.

Experiential learning makes student interactions and content connections relevant to the educational process. Experiential learning has a long-standing tradition in agricultural education programs, which incorporate "learning by doing" theory through supervised agricultural experiences (SAE) with significant positive student achievement (Cheek et al., 1994). There is compelling evidence from the work of educational theorists and empirical studies, that agricultural education could thrive in an environment that incorporates cross-disciplinary linkages and hands-on activities. The remaining challenge for agricultural literacy at all grade levels, however, is to find the curricular commonalities and to promote interdisciplinary cooperation. Just a handful of studies have been concerned with teachers' perceptions and their preparations to make changes in their content teaching (Terry et al., 1992). Fullan (1982:107) says it best: "educational change depends on what teachers do and think."

Attitudes and Behavior

Individuals develop attitudes as they interact with family, friends, and others in society during the course of their lives (Fishbein & Ajzen, 1975). Attitudes can be positive or negative and are usually formed as a response to an individual's experiences (Ajzen, 1985). However, attitude is not the only factor in predicting behavior. Fishbein and Ajzen (1980) theorized that a person's intention toward a behavior is part of an interaction of beliefs and attitudes. Individuals' perceptions of the social pressures to perform a behavior, when aligned with the perceived evaluation of the consequences of carrying out the behavior are posited as the theory of reasoned action (TORA). Individuals will intend to perform a behavior when they have first evaluated it positively and then when they think that others feel it is important that they perform the act. Accordingly, the immediate and long-term impacts of the behavior are important.

Triandis (1977) posited a similar theory of behavioral intention. Four factors function together to form the model: (1) attitudes, (2) personal and social norms, (3) personal habits (or individual routines), and (4) expectancies about the behavioral consequences. According to Triandis, "when all four of the factors are consistent there is consistency between attitude and behavior" (p. 16). Consequently, any inconsistency in these factors produces less consistency between attitude and behavior. These models support the conclusion that predicting behavior is related to multiple factors.

The theory of reasoned action (TORA) had empirical support, but the problematic issue about the theory was that it neglected social pressures, or subjective norms, as significant influences on behaviors. "Most behavior of interest seems to require social others" (Liska, 1984, p. 63). As a response to this weakness in the TORA model, Ajzen (1985) proposed the theory of planned behavior (TPB), which broadened the model to allow for the variable of the individual's perception of ease or difficulty in being able to perform the behavior.

Theory of Planned Behavior

The most comprehensive theory of attitudes and behavior to date is Fishbein and Ajzen's (1975) theory of planned behavior (TPB), which incorporates individuals' awareness, attitudes, and perceptions as the principal influences on their behaviors. This theory grew out of the theory of reasoned action (TORA) and has proven useful for evaluating programs intended to induce desirable behaviors (e.g., contraception among sexually-active teenagers) and to prevent undesirable behaviors (e.g., smoking).

Ajzen and Fishbein (1977) conducted a meta-analysis review of research on the attitude-behavior relation with a focus on correspondence in terms of target and action elements. Their review of 109 investigations shows that a person's attitude has a consistently strong relation with his or her behavior when it is directed at the same target and when it involves the same action. They take the position that a person's attitude toward an object influences the overall pattern of the person's responses to the object but alone is not a predictor of the actions. Attitudes are dynamic: they are learned, tested, re-learned, and adapted over time. Research by Doob (1967) supports the conclusion that "the learning, retention, and decline of an attitude are no different from the learning of a skill" (p. 42). Both attitudes and knowledge are learned. A persons's intention is (1) a function of the person's attitude toward doing the behavior and (2) of the subjective norm.

Behavior is viewed as consisting of four different elements: (1) the action, (2) the target at which the action is directed, (3) the context in which the action is performed, (4) and the time at which it is performed. When all targets are other human beings, for example, the target element is people in general. When the same action is observed with respect to different situations at different points in time, indices can be obtained such that the contextual element, the time element, or a combination of elements define the behavior (Ajzen & Fishbein, 1977, p. 890).

To predict behavior from attitude, the investigator must ensure high correspondence between at least the target and action elements of the measures employed (Ajzen & Fishbein, 1977, p. 912). Attempts to influence behavior by means of attitude change must also consider the degree of correspondence between the behavior that is to be changed and the attitude at which the influence attempt is directed. Demonstrating attitude change is insufficient evidence for one's ability to change behavior; only behaviors that correspond to the attitude are likely to change as a result of revisions in attitude (p. 913). Also, if subjective norms and perceived control are unchanged, changes in attitudes only create inconsistency and hence little change in behavior.

Perceived behavioral control includes behavioral intentions that indirect affect behavior. At the same time, perceived behavioral control can have a direct effect on behavior and is hypothesized to reflect an individual's actual control over performing the behavior (Figure 3.2). Madden et al. (1992) identified five directly-measured outcomes of interest: (1) behavior (BB), (2) intention to perform a specific behavior (BI), (3) attitude toward performing the behavior (A), (4) the subjective norm (SN), and (5) the perceived behavioral control (PBC). The combined contributions of attitude, subjective norm, and perceived behavioral control lead to the prediction of behavioral intention and to the resultant behavior (Figure 3.2). Also shown in Figure 3.2 are the dominant beliefs that guide behavior: (6) beliefs about the potential outcomes of the behavior (BB), (7) normative beliefs regarding how others view the behavior (SN), and (8) control beliefs (Ctrl) or beliefs about factors that enhance or impede performance of the behavior (Ajzen, 2001).

A final significant part of the schematic diagram of the Theory of Planned Behavior is (9) the actual behavioral control (ABC). Actual behavioral control pertains to the extent to which the individual "has the skills, resources, and other prerequisites needed to perform a given behavior" (Ajzen, 2002). Successful performance depends not only on a favorable intention but also on a sufficient degree of behavioral control. Early applications of TPB did not include ABC, which was added later. To the extent that the perceived behavioral control is accurate, it can serve as a proxy of actual control and can be used to predict behavior (Ajzen, 2002).

Each set of behavioral beliefs produces a positive or negative attitude toward a behavior. In context of the normative beliefs, the result is perceived social pressure or the subjective norm. Control beliefs produce perceptual behavioral control. The person's perception of his or her control over internal factors to be controlled includes such things as skill mastery, access to information, physical abilities, possession of a workable plan, willpower, presence of mind, time, and opportunity (Ajzen, 1985, p. 36). When combined, the attitude, subjective norm, and perception of behavioral control then help formulate a behavioral intention. Usually, the more favorable the attitude and control, the stronger the person's intention to execute the behavior. Therefore, intention is assumed to be the antecedent of behavior (Fishbein & Ajzen, 1975; Ajzen & Madden, 1986).

Autonomy, Self-Efficacy, and Control

Teacher autonomy is closely related to the psychological concept of self-efficacy, which refers to an individual's perception of his or her ability to complete all the necessary actions needed to attain successful performance (Bandura, 1977; 1982). Ajzen (1991) posits that perceived behavioral control is synonymous with Bandura's definition of self-efficacy. Bandura (1986) distinguishes a difference between self-efficacy from outcome expectations, which judges likelihood of behavior consequences. For example, the belief that one is capable of successfully learning the material for a statistics class (self-efficacy) is different from the belief that turning in homework will result in achieving an "A" in the course (evaluation).

Ajzen and Madden (1986) suggest that the more control individual perceives over a certain behavior, the more that person will try to perform that behavior. Consequently, the researchers conclude that including the measure of perceived behavioral control will improve the ability to predict behavior and goal success. This insight is particularly relevant to this study because teachers do perceive external controls, such as the Sunshine State Standards (which were defined by the Florida Department of Education) and teaching content included on state comprehensive exams.

In the context of teaching, the individual teacher's current practices significantly impact the choice to adopt new curricula that require new practices. If new curricula are perceived as easy to adopt with minimal effort or capital investment and they do not require a major shift of norms from the individual, the likelihood that the new practices will be adopted is greater (Brown, 1981; Rogers, 1995). Results from work by Trafimow and Finlay (2001) indicate that intentions depend greatly upon the extent to which an individual is controlled by attitudes or norms. However, attitudes accounted for more variance in intentions than the subjective norms in relation to the same behaviors (Trafimow and Finlay, 2001) .

Applications of the Theory of Planned Behavior

Numerous studies have been conducted to test the explanatory and predictive abilities of the theory of planned behavior. Studies of weight loss and class attendance behaviors were early tests of the theory (Schifter and Ajzen, 1985; Ajzen and Madden, 1986). Both studies found that the perceived behavioral control was a significant predictor of intention and behavioral achievement. In the first study, 83 university women who classified themselves as overweight participated in a two-stage experiment over a period of six weeks. High perceived behavioral control was shown to significantly increase both intentions to lose weight and actual weight loss.

Researchers from other disciplines have applied the TPB model in an effort to predict behaviors. Hausenblas et al. (1997) and Godin and Kok (1996) completed a meta-analysis of both TORA and TPB related to exercise behavior. The addition of perceived behavioral control significantly contributed to both the predictive and the explanatory capability of the model in virtually all the work analyzed. Godin and Kok find significant relationships between several pairs of TPB constructs: intention and exercise behavior, perceived behavioral control and intention, attitude and intention, attitude and exercise behavior, and perceived behavioral control and exercise behavior. In study of addiction counselors, Breslin et al. (2001) found TPB to be effective in predicting research dissemination and influenced attitudes and social norms, which ultimately increase counselors' motivation to adopt new addiction treatment programs.

TPB has been applied to predict behaviors and has shown a capacity to explain and predict many behaviors, including driving behaviors (Parker et al., 1992; Parker et al., 1995); eating behaviors (Sparks & Shepherd, 1992; Berg, Jonsson & Connor, 2000); applying to graduate school (Ingram et al., 2000); exercise and sport behaviors (Courneya et al., 1999; Mummery et al., 1999; Kerner & Grossman, 1998; Terry & O'Leary, 1995); intentions to volunteer among older people (Warburton & Terry, 2000); intentions that influenced levels of trying to participate in a behavior (Mather, 1998); gender differences in technology adoption decision-making processes (Venkatesh et al., 2000); intentions to perform health behaviors (Finlay et al., 1999); intentions to play the lottery (Sheeran & Orbell, 1999), motivation to care for aging parents (Rappaport & Orbell, 2000); prediction of condom use (Albarracin et al., 2001); attitudes toward pollution prevention (Cordano & Frieze, 2000); teachers' sense of efficacy working with exceptional student inclusion (Stanovic & Jordan, 1998); determinants of science teachers' intentions to implement a state science model into their instruction (Haney et al., 1996); predicting hunting intentions and behavior (Hrubes et al., 2001); playing video games, voting behaviors, and gift giving (see Ajzen, 1991 for a review).

Several studies have been conducted using the TPB model to examine behaviors similar to this study. Osborne and Dyer (1998) used this framework for predicting high school science teachers' attitudes toward secondary level educational programs in agriculture. Based on responses from 211 high school science teachers, Osborne and Dyer found that, overall, science teachers are uncertain about their attitudes toward high school agriculture programs. Issues such as sharing lab materials and space (their attitudes toward the behavior), sharing curricular materials and discussing teaching strategies and course content (their subjective norms), and implementing team teaching (their perceived behavioral control) were all measured to determine the extent to which science teachers would collaborate with agriculture teachers.

Similarly, Trexler and Suvedi (1998) examined the integration of agricultural content in elementary-level science instruction. Based on the TPB framework, the authors reasoned that teachers' intent to participate in elementary agriscience programs can be predicted by teacher beliefs about agriculture and science. The intervention's purpose was to develop a process for agriscience curriculum development and agricultural theme alignment with their state's science curriculum mandates, and to adopt and implement the curriculum in the elementary schools. The principal findings after the three-year intervention were: 1) teachers and principals believe agricultural jobs "usually" demand much education, which includes an in-depth understanding of science; 2) teaching science through agricultural examples is supported more by principals than by teachers; 3) teachers and principals agree that teaching science is fun and applicable to real life; 4) there are differences between teachers' and principals' perceptions about teaching agriculture and using agricultural examples as the way to teach science; 5) teachers perceived themselves as "usually" comfortable using hands-on science activities to teach; and 6) principals indicate less confidence in their teachers' comfort using hands-on activities and teaching life sciences.

In order to develop successful elementary agriscience curricula, Trexler and Suvedi's (1998) study suggests that teachers must become comfortable with agriculture. The greater the teacher comfort with science concepts, the greater the tendency to use agriculture as a context for teaching science. In terms of the TPB model, behavioral beliefs and attitudes toward the behavior directly impact intention and subsequent behavior. Teachers also may be aware of the potential for and the opportunity to use agriculture as the approach to teach science, but they need to develop expertise in agricultural concepts (Terry et al., 1992; Humphrey et al., 1994).

Trexler and Suvedi reported that teachers and principals also requested examples of how to apply agricultural elements in curriculum development. This reflects lower levels of perceived behavioral control in the TPB model. Lastly, an extended support network and service to support teachers' perceptions about agriculture would at the same time diminish their reluctance to use agricultural themes for science teaching in elementary school settings. This is represented in the TPB model through the subjective norms.

The Theory of Planned Behavior model has been used successfully to analyze other teaching and learning situations (see, for example, Haney et al., 1996; Stanovic & Jordan, 1998). Osborne and Dyer (1998) and Trexler and Suvedi (1998), both summarized above, examined factors related to agricultural education, but neither specifically addressed the issue of curricular infusion.

Modifications to the Theory of Planned Behavior

The Theory of Planned Behavior is evolving. Since it was conceived, various researchers as well as its progenitors have incorporated extensions and modifications to the model. For example, Parker et al. (1995) added what is referred to as "a personal norm" to the TPB. Later, Parker et al. (1998) added a measure of affective or emotional attitude to help explain aggressive behaviors. Ajzen has incorporated some of these ideas in recent proposed modifications to the TPB.

For this study, several modifications were made to the TPB model shown in Figure 3.2. First, over thirty years ago, Ajzen and Fishbein (1970) suggested that attitudes be separated into two distinct constructs. As shown in Figure 3.3, experience-based attitudes about a behavior (ATBE) are differentiated from the attitudes toward instrumentally performing the behavior (ATBI). The measurement of ATBE refers to the individual's perception of the emotional experience of performing the behavior – for example, would it be an enjoyable or positive act. The instrumental performance of a behavior (ATBI) is how individuals perceive themselves actually being instrumental in carrying out the act or behavior. An example of these two distinct notions is a attendance at a workshop. In this context, a different experiential attitude toward attending is elicited based on a good or bad previous experience. An attitude of responsibility would be to see the need to attend the workshop, whether an individual "liked" attending or not.

Second, models of Ajzen's treatment of normative beliefs hint at a distinction between normative beliefs and subjective norms. Early work by Fishbein and Aizen (1975) depicted normative beliefs as a group's perceived behavioral expectations – for example, statements that elicit perceptions of what a teacher thinks other teachers think are the "norms" of the job performance. Normative beliefs result in the person's perceived social pressure. Combined, normative beliefs and subjective beliefs are influenced by motivations to comply and by control beliefs. Ajzen (2001) recommends treating normative beliefs and subjective norms as a single unit of analysis (subjective norms) that together lead to the formation of behavioral intentions.

Third, outcome evaluations are added as an important linkage, because the perceived outcome evaluations influence attitudes and beliefs (Ajzen, 1991). Outcome evaluations are not generated after performing the behavior– attending a workshop or being a responsible parent – but actually are a cognitive function of evaluating the long-term reasoning for performing the behavior. This evaluation is made prior to and influences the decision to perform a behavior – in this case, whether to attend an agricultural education workshop. Finally, motivations to comply are viewed as a distinct influence on behavioral beliefs, normative beliefs and subjective norms, and control beliefs. Moreover, social motivations are separate from economic motivations.

The classic TPB (Figure 3.2) represents the human cognitive process that continually feeds back experiences from behaviors to alter attitudes, beliefs, and norms. Consequently, it is a complex causal chain, and teasing out the significant influences on a given behavior is difficult (Terry & O'Leary, 1995; Hagger et al., 2002). Researchers, therefore, have sought alternative conceptual models. Parker and her colleagues (Parker et al., 1992; Parker et al., 1995; Parker et al., 1998) have used a simpler model of behavioral intent in which each construct can independently influence behavioral intent (Figure 3.4).[1]

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[1] Parker and colleagues conceptualized a sequence of causal effects in their studies. Parker wrote that attitudes, subjective norms, and perceived behavioral control have the most proximal effect on behavioral intent, while beliefs were antecedents to these three factors. Demographic attributes, which can be powerful predictors of behavioral intent, were conceptualized as exogenous factors to beliefs, attitudes, norms and perceived.

Given the variation in the definition of constructs and relationships specified for TBP models reviewed earlier, no single model has been shown to be clearly superior. Because this study explores the application of the TPB in a new context, it is reasonable to begin by examining relationships through simpler conceptual models. This study's focus will be on establishing whether attitude, beliefs, subjective norms, and other TPB constructs have measurable net effects on behavioral intentions to attend a FAITC workshop. This approach is appropriate when causal relationships are ambiguous and theory is not well-developed -- conditions which characterize this study.

Although it is known that behaviors can differ among sub-groups, most TPB studies by psychologists and those in medical fields tend to use a single demographic cohort (e.g., undergraduate university students or women between 40 and 45). Therefore, variation across demographic groups is typically not considered. The addition of demographic variables in studies of the TPB can be an important substantive enhancement. Since 1992, Parker and her colleagues (Parker et al., 1992; Parker et al., 1995; Parker et al., 1998) have analyzed determinants of driving violations. In this research, they have analyzed TPB constructs as predictors of intentions to commit such behavior, but they also include demographic variables, including age, sex, and previous accidents, as predictors in a single multiple regression model. Such variables, particularly age, exert an effect on aggressive or illegal driving behaviors above and beyond that of the TPB constructs. In doing so, Parker and her colleagues have identified their subjects' demographic characteristics as well as measures of their beliefs, attitudes, norms, and other TPB constructs.

Based on the information about participation in FAITC workshop (reported in Chapter 2), teachers are more likely to teach agricultural education tend to be in rural areas and, hence, to attend agricultural education workshops than suburban and urban teachers. Traditionally, agricultural education has its roots in the rural areas and in the high schools, where vocational agricultural (Vo-Ag) programs were part of the standard curriculum (Hillison, 1996). Many vocational agricultural programs were offered in the rural locations closest to farms and production agriculture. In addition, teachers who were raised in a farm or ranch environment, or who had participated in 4-H or FFA, regardless of where they now teach, are perhaps more likely to incorporate agricultural concepts in their classrooms. Figure 3.5 illustrates the simplified TPB model modified which incorporates demographic variables.

Conclusion

This chapter has reviewed literature on the Theory of Planned Behavior. TPB has been used widely throughout the social sciences and, to a lesser extent, in educational and agricultural educational contexts. The following chapter will describe the methodology used to examine teacher participation in Florida Ag in the Classroom workshops.

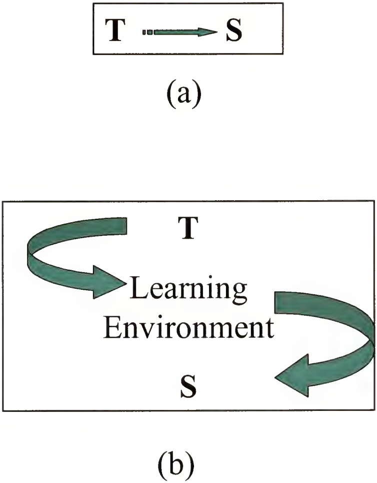

Figure 3.1 Schematic Representation of the Objectivist (a) and Constructivist (b) Learning Paradigms

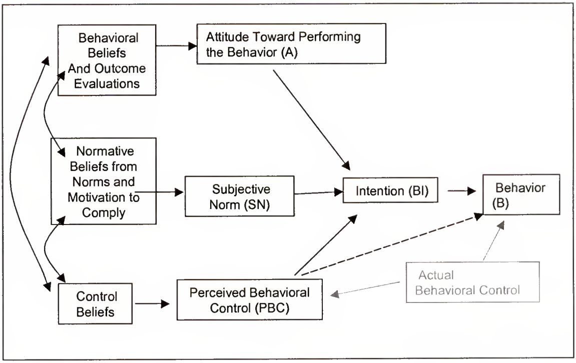
Behavioral Beliefs And Outcome Evaluations
Attitude Toward Performing the Behavior (A)
Normative Beliefs from Norms and Motivation to Comply
Subjective Norm (SN)
Intention (BI)
Behavior (B)
Actual Behavioral Control
Control Beliefs
Perceived Behavioral Control (PBC)

Figure 3.2 Schematic Diagram of the Theory of Planned Behavior

Source: Based on Ajzen (2002).

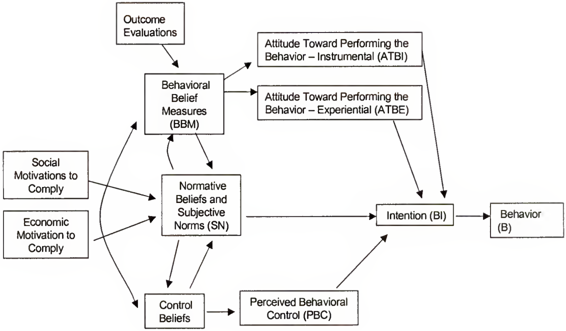
Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Behavioral Belief Measures (BBM)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
Economic Motivation to Comply
Intention (BI)
Behavior (B)
Control Beliefs
Perceived Behavioral Control (PBC)

Figure 3.3 Schematic Diagram of the Modified TPB Model

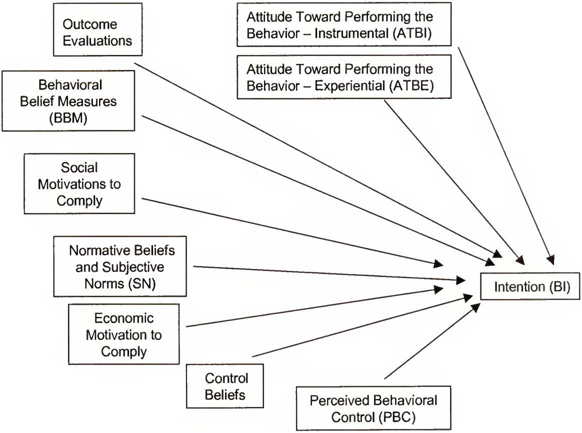
Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
Intention (BI)
Economic Motivation to Comply
Control Beliefs
Perceived Behavioral Control (PBC)

Figure 3.4. Simplified Model for Theory of Planned Behavior

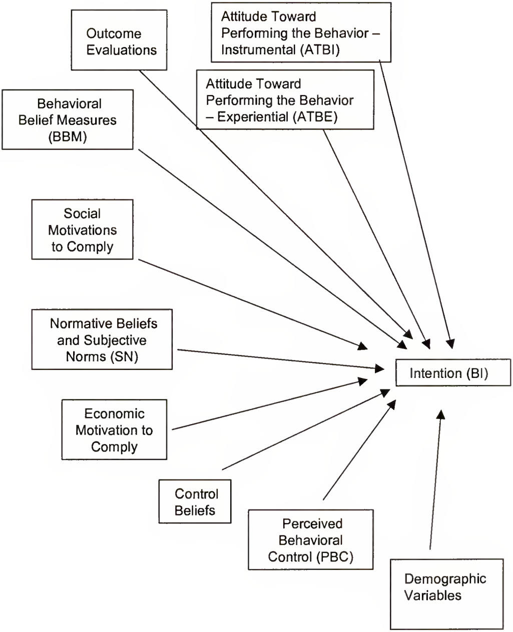
Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
Intention (BI)
Economic Motivation to Comply
Control Beliefs
Perceived Behavioral Control (PBC)
Demographic Variables

Figure 3.5. Expanded Simplified TPB Model, Incorporating Demographic Variables

CHAPTER 4
METHODOLOGY

The purpose of this study is to determine how teachers' awareness, attitudes, perceptions and prior knowledge of agriculture affect their intention of attending Florida Agriculture in the Classroom workshops and teaching these topics. These workshops are designed to disseminate agricultural curricula for teacher use to help increase agricultural literacy in Florida. Teachers from 15 counties in Florida were designated as the population for the study, determined by the counties where the FAITC workshops had been offered.

The methods and procedures used are described in this chapter. These are presented in the following order: 1) research design; 2) instrumentation; 3) study population; 4) pilot test; 5) data collection; and 5) data analysis.

Research Design

This study is a result of work with the Florida Agriculture in the Classroom impact evaluation study, described in Chapter 2, which produced questions about how to differentiate between those who had participated and those who had not participated in FAITC workshops. These questions focused on teachers' awareness and knowledge of agriculture and biotechnology and of careers in those fields. The design is based on a non-experimental quantitative survey instrument for a comparative analysis study. In other words, the study was designed to compare groups of participants and nonparticipants to determine if there are differences in attitudes, awareness, perceptions and behavioral beliefs and, in turn, behavioral intentions to attend Florida Agriculture in the Classroom workshops.

Modeled after the Ajzen questionnaire for the Theory of Planned Behavior (Ajzen, 1991), a mail survey was used to collect primary data from the sampled teachers. Reasons for using a mail survey included the low cost to collect data from large numbers of individuals and the ease for people to complete by being well designed. Mail surveys also can minimize sampling error, and provide for a greater sense of privacy for the participants. Well-designed surveys can be less sensitive to biases than those using interviewers. On the other hand, mail surveys have several weaknesses, including the fact that mailing lists are often inaccurate. In addition, nonresponse error can be a problem. Finally, researchers have little or no control of the survey once it is mailed; there is no way to monitor who fills out the survey (Dillman, 2000). On balance, mail surveys can be an affordable and efficient way to collect data. Many other researchers in Agricultural Education have implemented this same strategy (e.g., Israel & Hague 2002; Osborne & Dyer 2000).

Instrumentation

The survey instrument evolved through ten iterations and revisions. Each version was refined to improve the implementation of Ajzen's (1985, 2001, 2002) guidelines for constructing a TPB questionnaire. Each of the questions was based on a semantic differential scale with a corresponding numerical code. A seven-point Likert-scale was used to measure perceived behavioral control score (e.g."I intend to attend an Agricultural Education workshop in the next year (extremely likely — extremely unlikely)"). Similarly, other constructs were measured by sets of items, for example "Hands-on classroom activities are necessary for learning (completely agree — completely disagree)" and "Using hands-on classroom activities for learning is: (extremely wise — extremely unwise)." Questions were added regarding teacher interest in new materials about Space Agriculture in the Classroom, pressures from mandated standardized testing (the Florida Comprehensive Achievement Test, or FCAT), and self-evaluation of agricultural literacy.

Questions to assess the "predictor variables" in the Ajzen model "can be assessed directly, by asking respondents to judge each on a set of scales" (Ajzen, 2001, p. 3). Attitudes toward the behavior of attending an agricultural education workshop, subjective norms, or what others think about the behavior, and perceived behavioral control, based on perceptions of autonomy and self-efficacy also measured corresponding beliefs. Each question of prediction was directly compatible with the behavior of attending a workshop on agricultural education in terms of "action, target, context, and time elements" (Ajzen, 2001, p. 3).

Questions about subjective norms, those beliefs that create perceptions of social pressures, were injunctive in nature to gain responses as to whether or not the respondents view important role models as influential.

Perceived behavioral control questions were aimed at gathering people's confidence about attending a workshop on agricultural education topics. Some of the items relate to the perception of easy or difficult access, or sense of being able to attend. Annually, teachers must gain in-service credits or upper-division credits to be recertified. In Florida, over a five-year period, teachers must have accrued 120 hours of continuing education. Teachers are often assigned to attend a particular subject or content-area workshop, such as one with math-related curricula. Therefore, workshop selection is often governed by authorities or by recertification requirements.

Other survey items refer to the respondent's autonomy and independence in making curriculum choices. For these items the teachers' beliefs as to whether they have control over the decision to attend the workshops were probed using a small set of items with Likert-scale responses. Belief-based measures were included, since beliefs are in large part the core of the Theory of Planned Behavior. The measurement of beliefs permitted an insight into why teachers hold certain attitudes, subjective norms, and perceptions of behavioral control.

Social motivations are separate from economic motivation. This represents the motivational factors included in the mail survey instrument. There were five items used to measure social motivations to comply. There was a single question included on motivation relating to economic incentives, the question referred to teacher willingness to attend Florida Agriculture in the Classroom workshops if they were to receive a stipend for attendance. The economic motivation question was meant to discern if teachers would be more likely to attend if an economic incentive were included or not, and to help the FAITC board of directors make marketing decisions for the benefit of the promotion of the program.

Three other sections were included. The first asked for demographic characteristics that vary among teachers: experience, effort devoted to planing lessons, farm or ranch background, present teaching location, and annual workshop attendance. Second, a section asked teachers to evaluate several reasons to attend workshops. The Likert scale used for these questions is scaled with one as the most positive response. The scale, then, can be thought of as similar to a golf score or ranking, where a lower number is superior to a higher number. Finally, a section asked for the use of several information sources about workshop opportunities.

The final survey consisted of 102 items, 71 of them organized into 13 sections as well as 11 items eliciting demographic information (see Appendix A). Table 4.1 contains the questionnaire items that requested demographic information from the teachers in the study. The survey questions corresponding to constructs in the Theory of Planned Behavior are shown in Table 4.2. Appendix B contains the survey items, variable names, and Theory of Planned Behavior (TPB) constructs represented by each.

Ajzen (2001) suggests the *Theory of Planned Behavior* model is intended to ensure high internal consistency in measures of behavior, intention, attitude, subjective norm, and perceived behavioral control as "a minimal requirement to confirm the assumption that the items selected do in fact assess the same underlying construct" (Ajzen, 2001, p. 12). Ajzen also acknowledges that no assumption is made that accessible beliefs are internally consistent since people's attitudes can be ambivalent, that is, producing positive and negative outcomes.

Multiple items were used to assess a given construct to secure reliability and internal consistency. Items assessing a specific construct were separated and interspersed with elements for the other constructs (Ajzen, 2001). There is no standard number of items in a TPB questionnaire. Studies have as few as seven items (Parker et al., 1998), while others range to one hundred or more (Lepre, 2000).

Study Population

The population consisted of two groups of teachers of grades K-12 currently working full-time in public schools. First, a random sample of 500 was drawn from the lists of all of the teachers who had participated in Florida Agriculture in the Classroom workshops. The workshops were offered in 1998, 1999, 2000, and 2001. Approximately 1,200 teachers participated in these workshops. A sample size of 200-500 is recommended by Israel (1992a); the high end of this range was used to anticipate potential non-response, minimize sampling error, and increase the likelihood of identifying relationships that do, in fact, exist during the analysis.

Second, a list of 84,221 names and addresses of teachers from 15 counties in Florida provided by the Florida Department of Education was used to select a random stratified sample of 500 teachers whose county school districts had been offered FAITC workshops and materials but these teachers had not participated in the program or used the materials. The home addresses of the teachers were used in order to reach teachers on summer break. School addresses were used for other teachers with no available home address. There is a potential for coverage error. Although this list of names and addresses is fairly comprehensive, some teachers may have chosen to opt out for privacy reasons and would not be included in this database.

Both participant and non-participant groups of teachers were surveyed with the same instrument regarding their awareness, attitudes and perceptions about attending workshops on agricultural education. Therefore, data gathered from these two groups of 500 allowed for a causal-comparative analysis.

Pilot Test

A pilot test of the survey served three purposes: a) to determine the “best” items as measures of attitudes and behavioral beliefs about attending agricultural literacy workshops; b) to provide an opportunity to collect data to test the reliability of the measures; and c) to provide an opportunity to gain input of comments, suggestions, and impressions about the survey. The pilot survey consisted of 110 items organized into 13 sections, and was tested in April and May 2001 on four groups: 1) eight University of Florida Agricultural Education graduate students; 2) an expert review panel of three faculty members in Agricultural Education and Communication at the University of Florida; 3) 21 pre-service student teachers in the University of Florida College of Education in their last semester of classes prior to graduation; and 4) ten teachers from three different schools in Alachua County.

The pilot survey was deemed far too long by most respondents. In order to reduce its length, reliability analysis of the items each of nine sections (each of which contained eight questions) was performed using *SPSS for Windows 10.0* and the procedure Scale– Reliability Analysis. In each section, the question with the lowest Chronbach's "alpha to remove" coefficient was eliminated iteratively, until each section contained five questions with the highest coefficients, as recommended by George and Mallery (2001). A few other revisions were made to improve wording and correct errors. The Chronbach's alpha coefficients for the 8-items per section pilot survey and of the 5-items per section final survey are found in Appendix Table C1.

Data Collection

The data was collected through a mail survey done in six "waves" from June, to November, 2002. The first mailing was a pre-card to notify teachers in the study sample to expect the survey packet (Dillman, 2000). The first packet was mailed with the cover letter, questionnaire, and a pre-addressed, stamped return envelope. The third round of mailings was a reminder postcard to those who had not yet responded. The postcard was designed to encourage more teachers to complete and return the survey. The fourth mailing, a second complete packet used a slightly revised cover letter, to invite non-respondents to take the opportunity to participate, to be included in the important research, and know that their responses were still wanted. The fifth mailing was a reminder postcard with a little bit of humor, a picture of a jigsaw puzzle missing one piece, was their final chance to get counted. Those who had not responded were sent a third survey packet, as the sixth mailing. Appendix D contains all correspondence (postcards and cover letters) described above.

All surveys received by November 25, 2002 were included in the analysis. The final response rate was 29.1%, after removing 188 surveys that were returned because they had been sent to an address that was no longer valid, and 21 returned unusable, usually with a statement that the addressee is not currently a teacher (Table 4.3). Of the 230 usable responses, 97 were from teachers who had been participants in one or more FAITC workshops, and 133 were from teachers who had not participated in a workshop (Table 4.4). A larger number of teachers who had participated in FAITC workshops evidently could not be reached because of bad addresses. The address list for the participants had come from the registrations of workshops over a four-year period, so it is likely that some teachers had moved since their addresses were recorded. Consequently, there was a 25.2% response rate for participants, compared to a 32.8% rate for nonparticipants. While both of these results are low, timing of the survey long after the workshops was also a factor in the low response rate, along with the problem that teachers perceive themselves as overworked and undervalued. The length of the survey might have reduced the response rate. The time pressure perhaps especially affects young teachers, seen by the underrepresentation of teachers with less experience among the respondents. Most of the surveys returned unusable, or not completed, were from teachers who indicated that they are no longer teaching (which made them ineligible for the study population). Finally, some may have been less likely to respond because they were surveyed for the impact evaluation study completed in 2001 (described in Chapter 2).

Given the low response rate, available data was used to assess the extent and nature of potential non-response bias.[2] The nonparticipants were more nearly representative of all Florida teachers in terms of grade level at which they teach than were FAITC participants (Table 4.5). However, it is evident that respondents were more likely to be elementary teachers, that FAITC participants were disproportionately elementary teachers and that high school teachers were under represented among participants (10.1% versus 25.4%). Respondents of both groups also had more years of teaching experience than the average Florida teacher. This is particularly true among nonparticipants, who averaged 17.1 years experience, four years more than the statewide average.

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[2] Most studies in agricultural education report moderate to high response rates. Only 4.6% of 304 articles reported a response rate lower than 50% (Linder et al., 2001), but in many cases these studies focused on a highly salient topic for a specialized audience. Certainly, the salience of this survey would be fairly low for most teachers in the sample.

Because respondents differed in experience and grade level from the state-wide population, bias can threaten the external validity of the study (Ary et al., 1996). As a consequence, these factors will be included as co-variates in multi-variate models in the analysis (Babbie, 1995). This procedure will provide unbiased estimates of the other variables, specifically those for TOPB constructs, in the model.

Data Analysis

Chapter 5 contains the analysis of the FAITC participants and nonparticipants within the framework of the Theory of Planned Behavior. Separate analyses were conducted for participants in FAITC workshops from 1998 to 2002 (n=97) and nonparticipants (n=133). The groups are not analyzed together because there are, necessarily, substantial differences between the two groups in their awareness of, contact with, and experience with agriscience concepts and agricultural literacy.

The Theory of Planned Behavior is analyzed in two ways. The first involves a series of bivariate linear regressions of the pairs of TPB constructs that represent a causal influence of one construct on another, as shown in Figure 3.3. The standardized regression coefficients, or beta coefficients, can be compared to assess the relative influence of the various constructs (Terry & O'Leary, 1995; Hagger et al., 2002).

The second analysis includes all of the TPB constructs in a single multiple regression model. Work by Parker et al., (1992, 1998) illustrates this straightforward method of calculating the strength of each construct. This simplified analysis of TPB, illustrated in Figure 3.4, ignores the causal flows among constructs and instead estimates parameters for each of the TPB constructs as an independent influence on behavioral intent (BI). Thus, the TPB can be analyzed by means of a single multiple regression analysis rather than a series of individual bivariate regressions. It is typically recommended with small sample sizes usually would suggest a stepwise approach is preferred. A multiple regression, in which all variables are entered, is recommended over a stepwise regression model by Agresti and Finlay (1997) for analysis of a well-established theoretical model such as the TPB. In addition, the analysis will follow the precedent of Parker et al. (1998) and include demographic variables within the same analysis in order to decide if those variables significantly influence behavioral intent above and beyond the effect of TPB constructs. Figure 3.5 illustrated the expanded simplified TPB model.

In order to compare nonparticipants and participants in FAITC workshops, each TPB construct is calibrated by utilizing a single, weighted score. A principal components analysis (PCA) of the items on each construct provides a score that is weighted by the degree to which each item contributes to the first principal component for that construct. The first component, which has the largest eigenvalue and explains the greatest proportion of variance among the components, represents the maximum common variance among all the items in each construct.

For some constructs, especially those with few items, the first principal component will capture the bulk of the variance and have a single large eigenvalue. For other constructs, measured by larger numbers of survey items, the analysis is done iteratively and eliminates items from that construct that have high loadings on components other than the first and relatively low loadings on the first component. This approach has the advantage of ensuring that there is a single component with an eigenvalue greater than one and that it is unidimensional.

One construct will be an exception: Economic Motivation, workshop participants receiving a stipend, was measured by a single item, stands alone in each analysis. Therefore, the first set of analyses in Chapter 5 reports, for FAITC participants and nonparticipants separately, the TPB model operationalized with one component score per construct calculated by principal components analysis to assess bivariate relationships. The next set of analyses reports, again for FAITC participants and nonparticipants separately, the simplified and expanded-simplified TPB model. These results also are reported in Chapter 5.

This study also includes a number of contextual intervening variables that fall outside the framework of the Theory of Planned Behavior. These can be considered internal and external factors for understanding why some teachers – and not others – participate in FAITC workshops. These two sets of factors combine to influence teachers' awareness, attitudes, and perceptions and, therefore, the probability of a teacher attending a workshop. Exploratory analyses of these relationships will be reported in Chapter 6. All of the analyses of the TPB model are reported in Chapter 5. Analyses of questions in the survey that fall outside the TPB framework are reported in Chapter 6.

Table 4.1 Demographic Questions

Question	Response Options
How many years of teaching experience do you have?	_____ years
How many years have you taught in Florida?	_____ years
Were you raised on farm or ranch?	Yes No
What grade level(s) do you teach?	K-2 3-5 6-8 9-12
About how many teacher workshops do you attend yearly?	_____ number of workshops
Are you currently pursuing an advanced degree?	Yes No
Do you work with student-teacher interns?	Yes No
About how many hours each week do you spend planning lessons?	1-3 4-6 6-10 11-15 15+
What kind of area do you teach in?	Urban Suburban Rural
What percentage of your students are on the free or reduced lunch program?	_____ percent
Are you a former member of 4-H and/or FFA?	Yes No

Table 4.2 List of TPB Constructs and Associated Survey Items

Theory of Planned Behavior Construct	Abbreviation	Survey Items
Belief Based Measures	BBM	1a, 1b, 1c, 1d, 1e, 2d, 3d, 6d, 11h
Attitudes towards Behaviors - Instrumental measures	ATBI	2e, 3e, 4e, 6c, 6e, 7.1d, 7.2b, 7.2c, 7.2e
Attitudes towards Behaviors - Experiential	ATBE	2b, 2c, 3b, 3c, 4b, 4c,4d, 5b, 5c, 5d, 6b, 7.1b, 7.1c, 7.1e, 7.2d
Normative Expectations - Subjective Norms	SN	8a, 8b, 8c, 8d, 8e
Social Pressures - Motivation to comply	MC	9a, 9b, 9c, 9d, 9e
Behavioral Intent	BI	10g,12a, 12b, 12c
Control Beliefs- power	Ctrl	10f, 10h, 10i
Perceived Behavioral Control	PBC	10a, 10b, 10c, 10d, 10e, 11a, 11b, 11c
Outcome Evaluation Measures	OutEv	2a, 3a, 4a, 5a, 5e, 6a, 7.1a, 7.2a
Motivation to comply - Economic incentive	EconMotive	12d

Table 4.3 Responses to Mailed Survey

	Usable responses	Returned unusable or not completed	Bad addresses
First wave – mailed 6/7/02	123	7	159
Second wave – mailed 7/3/02	85	12	33
Third wave – mailed 9/30/02	22	2	77
3-wave total	230	21	188*

*Several surveys were returned as bad addresses twice or even three times.

Table 4.4 Completed and Unusable Surveys, by FAITC Participants and Nonparticipants

	Number in sample	Completed surveys	Returned unusable or not completed	Unusable or bad addresses	Response Rate
Participants	500	97	6	109	25.2%
Nonparticipants	500	133	15	79	32.8%
Total	1000	230	21	188	29.1%

Table 4.5 Grade Level and Teaching Experience of Respondent Teachers and All Florida Teachers

	FAITC Participants	FAITC Nonparticipants	Florida teachers*
Grade Level			
Elementary	64.4%	57.9%	53.7%
Middle School	25.6%	20.0%	20.8%
High School	10.1%	22.1%	25.4%
Years Teaching Experience	15.0	17.1	13.0

* Source: Florida Department of Education (2002); U.S. Department of Education (2002).

CHAPTER 5
RESULTS

This chapter reports the results of the analysis concerning the Theory of Planned Behavior, including effectiveness of the overall model, issues of model specification, and issues of TPB construct calibration. The analysis was performed using *SPSS for Windows* 10.0 statistical software.

The analysis in this study distinguish between participants in FAITC workshops from 1998 to 2002 and nonparticipants. The groups are not analyzed together because of the substantial differences in their awareness of, contact with, and experience with agriculture and agricultural literacy. Therefore, the analysis separates the respondents into nonparticipants (n= 133) and participants (n= 97). Recall from Table 4.5 that the participants are disproportionately elementary and middle school teachers; relatively few are high school teachers. The nonparticipants also have more teaching experience (17.1 years) than the participants (15.0 years).

The correlations among the demographic variables are shown in Appendix Table E1. There are relatively few significant correlations. Some of them are expected, such as negative correlations among the various grade levels taught and among the type of area in which they teach (urban, suburban, rural). However, two variables are problematic. Number of years of teaching in Florida is highly correlated (.876) with number of years teaching. Consequently, number of years teaching in Florida was dropped from subsequent analyses. Secondly, percentage of students on free or reduced lunch was significantly correlated with urban, suburban, and rural and with grade level; consequently, it also was dropped from further analyses.

Construct Calibration

The TPB constructs are comprised of one to fifteen items. Reliability analysis was performed on each construct, which resulted in high Chronbach's alpha coefficients (Appendix Table B2). For analysis of the TPB, the constructs are calibrated as a single weighted score for each construct using principal components analysis (PCA) of items on each construct. Doing so provides a score weighted by the degree to which each item contributes to the first principal component. The first component, with the largest eigenvalue, explains the greatest fraction of variance among the components and represents the maximum common variance among all the items in each construct. The first principal component score for each respondent is a weighted composite of the items that measure each TPB construct.

The principal components analysis was done by deleting items that loaded on factors or components other than the first. For the complex constructs, after dropping items that defined other components, all first principal components explained a majority of the variance (Table 5.1).[1] Because component scores are standardized, the mean of the scores of each first principal component is zero, and its standard deviation is 1.0 (Rummel, 1970), not a midpoint of 4.0 as in the survey.

The correlation coefficients among TPB constructs which are thought to influence behavioral intent are shown in Table 5.2. Three points are noteworthy. First, the instrumental and experiential attitudes toward the behavior measures are highly correlated with each other, particularly for the participants and, second, with outcome evaluations. Third, perceived behavioral control is highly correlated with control beliefs, especially for nonparticipants. These strong relationships suggest that the upper and lower portions of the modified TPB model (Figure 3.3) represent two different combinations of influences on behavioral intent.

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[1] The component loadings of each item and its construct are shown in Appendix Table F1 and the communalities are in Appendix Table F2. Appendix Table F3 lists the survey items that were deleted in the principal components analysis.

Theory of Planned Behavior in the FAITC Context

This section reports the regression analyses of the pairs of constructs linked in Figure 3.3. It is imperative to note that a negative coefficient in the analyses indicates greater intention to participate in agricultural education workshops because the Likert scale used is scaled with one as the most-positive responses. The scale, then, can be thought of as similar to a golf score or ranking, where a lower number is superior to a higher number. Even when using the standardized principal component scores, a negative coefficient in the analyses indicates greater intention to participate in agricultural education workshops.

Table 5.3 reports relationships among TPB constructs for nonparticipants and participants, and Table 5.4 reports the standardized regression (Beta) coefficients for these relationships. Figures 5.1 and 5.2 illustrate these relationships in the schematic diagram of the modified TPB model. Four observations are worth noting. First, the relationships are statistically significant, with R^2 values from 2% to 53%. Second, the relationship between control beliefs and perceived behavioral control has the highest beta coefficient for nonparticipants. This lower portion of the diagram appears to be more important for nonparticipants. Third, the influence of both instrumental and experiential attitudes toward attending a FAITC workshop on behavioral intent are strongest for the participants. This upper portion of the diagram appears to be more important for participants. Fourth and finally, the relationship between social motivations to comply and subjective norms is very weak for both groups. This combination of findings would suggest that those teachers who perceive themselves as more autonomous (with higher self-efficacy) are more likely to intend to participate in the FAITC workshops, and that "others" do not have influence on their decisions about matters such as attending workshops.

Overall, all the expected TPB flows emerge from the analysis. Figures 5.1 and 5.2 also indicate that several relationships among constructs differ somewhat between participants and nonparticipants: control beliefs and subjective norms and both sets of attitudes toward performing the behavior (ATBI and ATBE). For the participants, the relationship between subjective norms and Control beliefs is nearly twice as strong as is that for the nonparticipants. The relationship between both ATBI and ATBE also are stronger for the participants. These relationships suggest that the teachers who participate in the FAITC workshops hold highly positive attitudes for including agriculturally related curricula in classrooms in general. They also equally value the conviction to personally become instrumental in implementing them when they are compared with teachers who have had no contact with FAITC or agricultural concepts.

A simplified approach to the TPB is to analyze all the constructs directly influencing behavioral intent. Tables 5.5 and 5.6 show the results of bivariate analyses of nonparticipants and participants respectively, and these are illustrated in Figures 5.3 and 5.4. All the constructs are significant influences on behavioral intent. However, for the nonparticipants, as suggested earlier, the constructs in the lower portion always have higher beta coefficients than is the case for participants. These constructs include subjective norms, economic motivation to comply, control beliefs, and perceived behavioral control, all of which indicate the influences by which nonparticipants could become interested and attend a workshop. Some of these constructs are acknowledged to be easier to manipulate than others. For example, offering a stipend as motivation is easier to manipulate than teachers' perceptions of their own behavioral control or sense of personal autonomy.

Table 5.8 examines the construct relationships within a reduced form best-fit model of the simplified TPB measuring the construct influences on behavioral intent. The first point to note is that the TPB model displays a high degree of explanatory power, as shown in the adjusted R^2 values of 72% for participants and 70% for nonparticipants. However, substantial differences exist between the best-fit models for the two groups, as shown in Figures 5.5 and 5.6.

Two TPB constructs, behavioral beliefs and perceived behavioral control, are significant for nonparticipants but not for participants. Behavioral beliefs is significantly influential for nonparticipants. This suggests that the nonparticipants hold stronger beliefs about their behaviors and especially about attending workshops. That is, they will go to the workshops they prefer, and an FAITC workshop might not be among the preferred possibilities. The significant and negative coefficient for perceived behavioral control would suggest that some nonparticipants may be more influenced to attend through local district approvals and comparability with other workshops in the privileged areas of math and reading.

The coefficient of subjective norms has a larger coefficient for participants than for nonparticipants. This may indicate that participants are more influenced by what other people think or by what they believe that other people think. Attitudes toward behavior - instrumental (ATBI) is also much more important for participants.

By contrast, control beliefs and economic motivations to comply are more influential for nonparticipants. Control beliefs suggests that teachers deciding whether to attend a workshop may be influenced by their own perceptions of personal autonomy, especially when related to workshop attendance. Economic motivations to comply means that teachers would be much more likely to attend a workshop if a stipend were paid to participate. While this issue appears to be about monetary incentives to generate interest in the content, there are two pragmatic issues to consider: associated expenses or costs, such as child care and transportation, incurred by teachers attending workshops and competition from other workshops offered to teachers that may include a substantial stipend.

Finally, adding demographic variables to the simplified model allows evaluation of the independent influence of teacher characteristics within the TPB framework. Table 5.8 and Figures 5.7 and 5.8 report the results of this analysis. Several interesting points emerge. Nearly all the constructs in the preceding analysis remain significant for both participants and nonparticipants. The level of explained variance increases slightly, to 71% for nonparticipants and 74% for participants. However, the constructs in the lower portion of the diagram – control beliefs and perceived behavioral control – shrink dramatically in influence (control beliefs) or fall to insignificance (perceived behavioral control). Two demographic variables enter significantly, both influencing intention of attending FAITC workshops: grades K-2 and rural location.

For participants, two shifts occur from the previous analysis. First, instrumental attitudes (ATBI) shifts to the experiential component of attitudes toward workshop attendance. This would seem to suggest that the participants value the cognitive value of teaching about agricultural topics in general and having that content included in classes, more so than actually performing the teaching of the content themselves. Second, the demographic variable Grades 6-8 is highly significant. This suggests that middle school teachers are much more interested in the agricultural teaching materials than are other groups of teachers.[2]

Discussion

The results presented in this chapter permit the overall utility of the TPB model to be assessed for understanding intention of attending a teacher workshop. To encourage greater teacher attendance, substantial stipends would encourage attendance at workshops, as indicated by the persistent significance of EconMotive. This construct represents teachers' autonomy as professionals, and it is they who decide whether or not to attend workshops and which workshops to attend. The varying influence of other constructs does not provide clues about policy changes that would increase workshop attendance.

The two groups least represented by previous attendees at FAITC workshops are teachers from urban and suburban areas. However, only teachers in rural areas of Florida show a statistically significant inclination to attend an FAITC workshop. Moreover, teachers of grades K-2 are the group most likely to be so inclined. This further perpetuates the stereotypical view that agriculturally related materials for classroom teachers find their way back only into rural classrooms and the primary grades. Outside those settings, pressures from the administrators, colleagues, and students' parents combine to encourage or discourage teacher involvement with agricultural topics.

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[2] All the above analyses were run with the first principal component score of a reduced set of items as the measure of each TPB construct.

Table 5.1 Eigenvalues and Variance Explained for Principal Components of TPB Constructs

	Component Eigenvalue		Variance Explained by Component	
TPB Construct	1	2	1	2
Nonparticipants				
Behavioral Beliefs	3.881	0.795	55.45%	11.36%
Attitudes Toward Behavior - Instrumental	3.112	0.760	62.24%	15.20%
Attitudes Toward Behavior - Experiential	3.445	0.906	57.41%	15.10%
Subjective Norms	4.248	0.370	84.96%	7.39%
Behavioral Intent	3.397	0.389	84.91%	9.73%
Control Beliefs	1.709	0.877	56.97%	29.24%
Perceived Behavioral Control	2.639	0.906	65.98%	22.60%
Outcome Evaluation Measures	2.544	0.805	63.59%	20.11%
Social Motivation to Comply	3.551	0.543	71.02%	10.85%
Participants				
Behavioral Beliefs	3.982	0.954	56.89%	13.63%
Attitudes Toward Behavior - Instrumental	2.911	0.851	58.23%	17.01%
Attitudes Toward Behavior - Experiential	3.590	0.947	59.83%	15.79%
Subjective Norms	4.010	0.440	80.20%	8.80%
Behavioral Intent	3.584	0.250	89.60%	6.25%
Control Beliefs	1.625	0.922	54.16%	30.72%
Perceived Behavioral Control	2.692	0.852	67.31%	21.29%
Outcome Evaluation Measures	2.498	0.999	62.45%	24.96%
Social Motivation to Comply	3.588	0.562	71.76%	11.23%

Table 5.2 Correlations among TPB Constructs: Nonparticipants (below the diagonal) and Participants (above the diagonal)

	BBM	ATBI	ATBE	SN	MC	Ctrl	PBC	OutEv	Econ
Behavioral Beliefs (BB)	--	.676	.613	.542	.276	.325	.166	.569	.344
Attitudes Toward Behavior - Instrumental (ATBI)	.625	--	.909	.556	.268	.356	.251	.874	.457
Attitudes Toward Behavior - Experiential (ATBE)	.461	.862	--	.522	.288	.336	.236	.875	.478
Subjective Norms (SN)	.625	.515	.432	--	.177	.383	.267	.482	.392
Social Motivation to Comply (MC)	.183	.265	.126	.183	--	.097	.002	.299	.096
Control Beliefs (Ctrl)	.432	.378	.201	.222	.029	--	.648	.324	.309
Perceived Behavioral Control (PBC)	.225	.127	.100	.037	-.051	.731	--	.230	.227
Outcome Evaluation Measures (OutEv)	.543	.878	.756	.455	.177	.400	.125	--	.591
Motivation to Comply - Economic Incentive (EconMotive)	.343	.460	.330	.381	.040	.447	.271	.529	--

Note: Correlations greater than .264 and .277 are significant at the .01 level for nonparticipants and participants, respectively; correlations greater than .179 and .217 are significant at the .05 level for nonparticipants and participants, respectively; and correlations greater than .152 and .175 are significant at the .10 level for nonparticipants and participants, respectively.

Table 5.3 Relationships among TPB Constructs as Measured by First Principal Component Scores (t values shown in parentheses)

Dependent Variable	Independent Variable	Constant	b	Adj. R^2	Constant	b	Adj. R^2
			Nonparticipants			*Participants*	
BI	ATBI	-0.063	0.627**	.422	-0.028	0.695**	.522
		(0.94)	(9.34)		(0.39)	(9.80)	
BI	ATBE	-0.060	0.466**	.228	-0.009	0.697**	.497
		(0.77)	(6.04)		(0.11)	(9.27)	
BI	SN	0.006	0.594**	.343	0.010	0.698**	.483
		(0.08)	(8.18)		(0.13)	(9.07)	
BI	PBC	-0.001	0.264**	.064	-0.003	0.327**	.107
		(0.15)	(3.12)		(0.31)	(3.43)	
ATBI	BB	0.009	0.635**	.385	-0.032	0.659**	.451
		(0.12)	(8.58)		(0.40)	(8.47)	
ATBE	BB	0.034	0.472**	.206	-0.019	0.601**	.368
		(0.41)	(5.62)		(0.22)	(7.10)	
BB	OutEv	-0.026	0.534**	.289	0.050	0.617**	.315
		(0.34)	(7.03)		(0.55)	(6.37)	
BB	SN	0.024	0.634**	.385	0.037	0.547**	.285
		(0.33)	(8.72)		(0.40)	(5.91)	
BB	Ctrl	0.022	0.441**	.180	0.020	0.342**	.096
		(0.27)	(5.29)		(0.20)	(3.23)	
SN	BB	-0.031	0.615**	.385	-0.045	0.537**	.285
		(0.44)	(8.72)		(0.49)	(5.91)	
SN	MC	-0.483*	0.144*	.025	-0.454	0.172+	.020
		(1.99)	(2.05)		(1.54)	(1.68)	
SN	EconMotive	-0.619**	0.203**	.139	-0.573**	0.258**	.144
		(3.95)	(4.61)		(3.28)	(4.02)	
SN	Ctrl	-0.019	0.177*	.024	0.007	0.174+	.020
		(0.21)	(2.02)		(0.07)	(1.66)	
Ctrl	BB	-0.041	0.423**	.180	-0.058	0.310**	.096
		(0.52)	(5.29)		(0.61)	(3.23)	

Table 5.3. Continued

Dependent Variable	Independent Variable	Constant	b	Adj. R^2	Constant	b	Adj. R^2
Ctrl	SN	0.005 (0.06)	0.224* (2.56)	.042	0.022 (0.23)	0.389** (3.94)	.137
PBC	Ctrl	0.001 (0.16)	0.737** (12.17)	.531	0.0003 (0.04)	0.645** (8.20)	.413

** Significant at 0.01; * significant at 0.05; + significant at 0.10.

Table 5.4 Standardized Regression (Beta) Coefficients of Relationships among TPB Constructs: Constructs Measured by Principal Component Scores

Dependent Variable	Independent Variable	Beta Coefficients	
		Nonparticipants	*Participants*
Behavioral Intent	Attitudes Toward Behavior - Instrumental	.654**	.726**
Behavioral Intent		.484**	.709**
Behavioral Intent	Subjective Norms	.590**	.699**
Behavioral Intent	Perceived Behavioral Control	.267**	.342**
Attitudes Toward Behavior - Instrumental	Behavioral Beliefs	.625**	.676**
Attitudes Toward Behavior - Experiential	Behavioral Beliefs	.461**	.613**
Behavioral Beliefs	Outcome Evaluations	.543**	.569**
Behavioral Beliefs	Subjective Norms	.625**	.542**
Behavioral Beliefs	Control Beliefs	.432**	.325**
Subjective Norms	Behavioral Beliefs	.625**	.542**
Subjective Norms	Social Motivations to Comply	.183*	.177+
Subjective Norms	Economic Motivations to Comply	.381**	.392**
Subjective Norms	Control Beliefs	.222*	.383**
Control Beliefs	Behavioral Beliefs	.432**	.325**
Control Beliefs	Subjective Norms	.222*	.383**
Perceived Behavioral Control	Control Beliefs	.731**	.648**

** Significant at 0.01; * significant at 0.05; + significant at 0.10.

Table 5.5 Bivariate Regression Analyses of Behavioral Intent on TPB Constructs

Independent Variable	Constant	b Coefficient	t-value	Standardized Coefficient (Beta)	Adjusted R^2
			Nonparticipants		
Behavioral Beliefs	-0.045	0.616**	8.95	.629	.391
Attitudes towards behavior-Instrumental	-0.063	0.627**	9.34	.654	.422
Attitudes towards behavior-Experiential	-0.060	0.466**	6.04	.484	.228
Subjective Norms	0.006	0.594**	8.18	.590	.343
Social Motivations to Comply	-0.027	0.178*	2.07	.183	.026
Control Beliefs	0.002	0.566**	7.84	.569	.319
Perceived Behavioral Control	-0.001	0.264**	3.12	.267	.064
Outcome Evaluations	-0.065	0.630**	9.52	.656	.426
Economic Motivation to Comply	-1.150**	0.377**	11.18	.704	.492
			Participants		
Behavioral Beliefs	-0.048	0.599**	7.39	.628	.387
Attitudes towards behavior-Instrumental	-0.028	0.695**	9.80	.726	.522
Attitudes towards behavior-Experiential	-0.009	0.697**	9.27	.709	.497
Subjective Norms	0.010	0.698**	9.07	.699	.483
Social Motivations to Comply	0.007	0.245*	2.31	.239	.046
Control Beliefs	-0.006	0.514**	5.74	.518	.260
Perceived Behavioral Control	-0.003	0.327**	3.43	.342	.107
Outcome Evaluations	0.000	0.703**	9.30	.706	.493
Economic Motivation to Comply	-0.944**	0.420**	7.82	.636	.398

Table 5.6 Reduced Form Best-Fit Model of Behavioral Intent as a Function of TPB Constructs

Construct	Coefficient	t	Beta	Coefficient	t	Beta
	Nonparticipants			*Participants*		
Behavioral Beliefs	0.154*	2.01	.157			
Attitudes towards behavior- Instrumental	0.167*	2.42	.174	0.340**	4.84	.356
Attitudes towards behavior- Experiential						
Subjective Norms	0.165*	2.47	.168	0.319**	4.62	.329
Social Motivations to Comply						
Control Beliefs	0.349**	3.91	.358	0.186**	3.09	.195
Perceived Behavioral Control	-0.143+	1.85	-.150			
Outcome Evaluations						
Economic Motivation to Comply	0.207**	6.32	.382	0.170**	3.86	.253
Constant	-0.647**	5.97		-0.409**	3.62	
Adjusted R^2	.704			.727		

** Significant at 0.01; * significant at 0.05; + significant at 0.10.

Table 5.7 Reduced Form Best-Fit Expanded TPB Model: Constructs Measured by First Principal Component Scores and Demographic Variables as Influences on Behavioral Intent

Construct	Coefficient	t	Beta	Coefficient	t	Beta
	Nonparticipants			*Participants*		
Behavioral Beliefs	0.144+	1.92	.148	0.122+	1.69	.128
Attitudes towards behavior- Instrumental	0.177**	2.61	.184			
Attitudes towards behavior- Experiential				0.282**	3.49	.285
Subjective Norms	0.147*	2.21	.149	0.279	3.88	.288
Social Motivations to Comply						
Control Beliefs	0.214**	3.64	.219	0.172**	2.73	.171
Perceived Behavioral Control						
Outcome Evaluations						
Economic Motivation to Comply	0.215**	6.65	.396	0.173**	3.91	.258
Grades K-2	-0.227*	2.17	-.112			
Grades 6-8				-0.411**	3.52	-.204
Rural	-0.339+	1.91	-.099			
Constant	-0.568**	5.08		-0.245*	2.06	
Adjusted R^2	.714			.743		

** Significant at 0.01; * Significant at 0.05; + Significant at 0.10

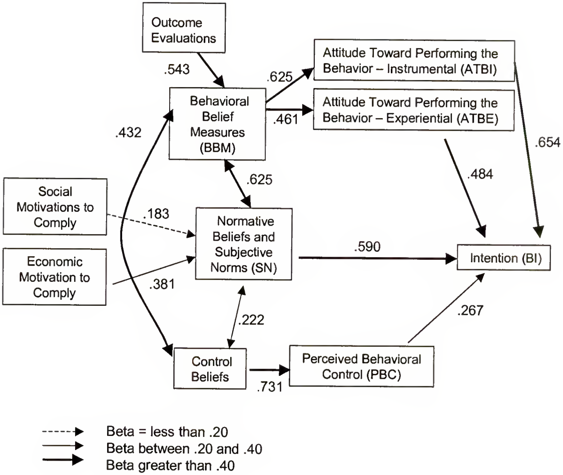
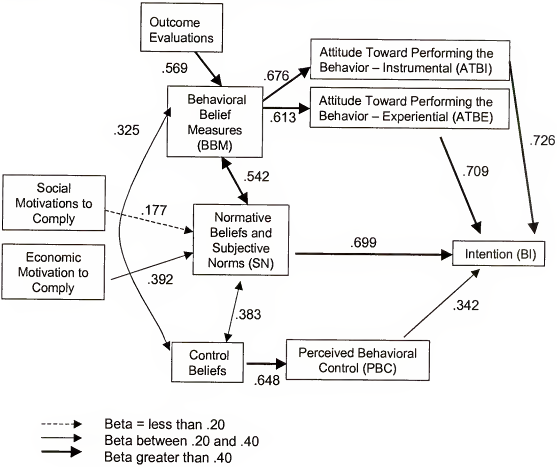

Outcome Evaluations
.543
Attitude Toward Performing the Behavior – Instrumental (ATBI)
.625
Behavioral Belief Measures (BBM)
.461
Attitude Toward Performing the Behavior – Experiential (ATBE)
.432
.654
.625
.484
Social Motivations to Comply
.183
Normative Beliefs and Subjective Norms (SN)
.590
Intention (BI)
Economic Motivation to Comply
.381
.222
.267
Control Beliefs
Perceived Behavioral Control (PBC)
.731
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.1 Standardized Regression (Beta) Coefficients: Nonparticipants

Source: Table 5.5

Note: These are beta coefficient from bivariate regression analyses.

Figure 5.2 Standardized Regression (Beta) Coefficients: Participants


Outcome Evaluations
.569
Behavioral Belief Measures (BBM)
.676
Attitude Toward Performing the Behavior – Instrumental (ATBI)
.613
Attitude Toward Performing the Behavior – Experiential (ATBE)
.726
.709
.325
.542
Social Motivations to Comply
.177
Normative Beliefs and Subjective Norms (SN)
.699
Intention (BI)
Economic Motivation to Comply
.392
.383
.342
Control Beliefs
.648
Perceived Behavioral Control (PBC)
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Source: Table 5.5

Note: These are beta coefficient from bivariate regression analyses.

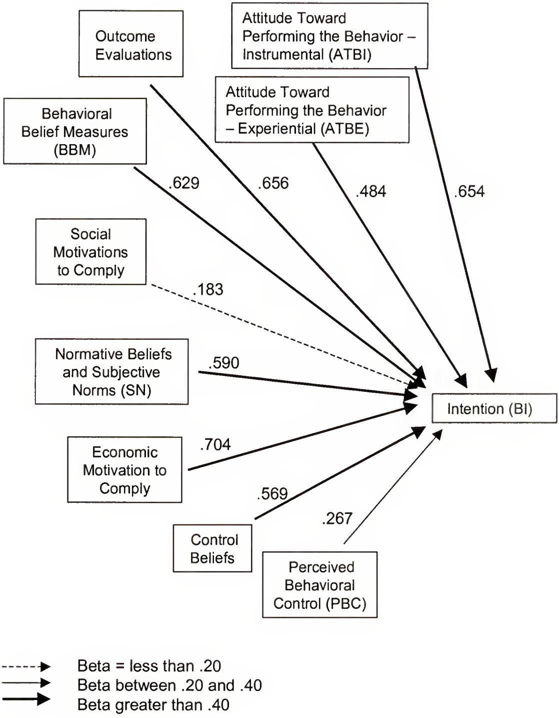

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
.629
.656
.484
.654
Social Motivations to Comply
.183
Normative Beliefs and Subjective Norms (SN)
.590
Intention (BI)
Economic Motivation to Comply
.704
.569
.267
Control Beliefs
Perceived Behavioral Control (PBC)
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.3 Beta Coefficients from Bivariate Regression Analyses of Behavioral Intent on TPB Constructs: Nonparticipants

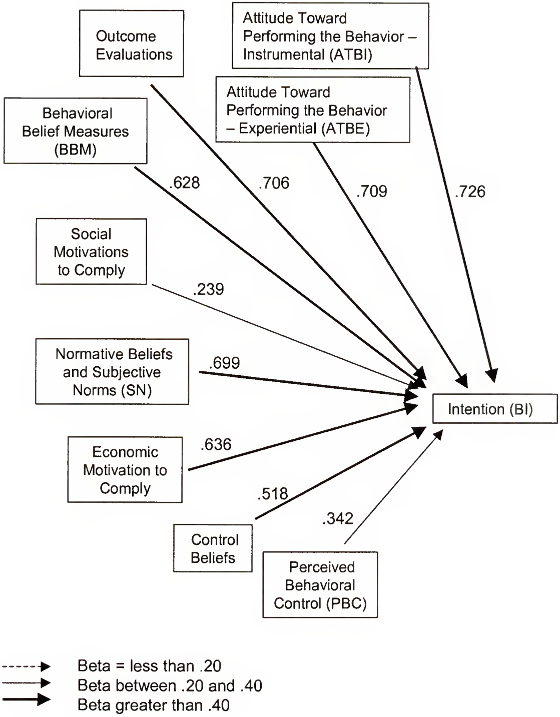

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
.628
.706
.709
.726
Social Motivations to Comply
.239
Normative Beliefs and Subjective Norms (SN)
.699
Intention (BI)
Economic Motivation to Comply
.636
.518
.342
Control Beliefs
Perceived Behavioral Control (PBC)
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.4 Beta Coefficients from Bivariate Regression Analyses of Behavioral Intent on TPB Constructs: Participants

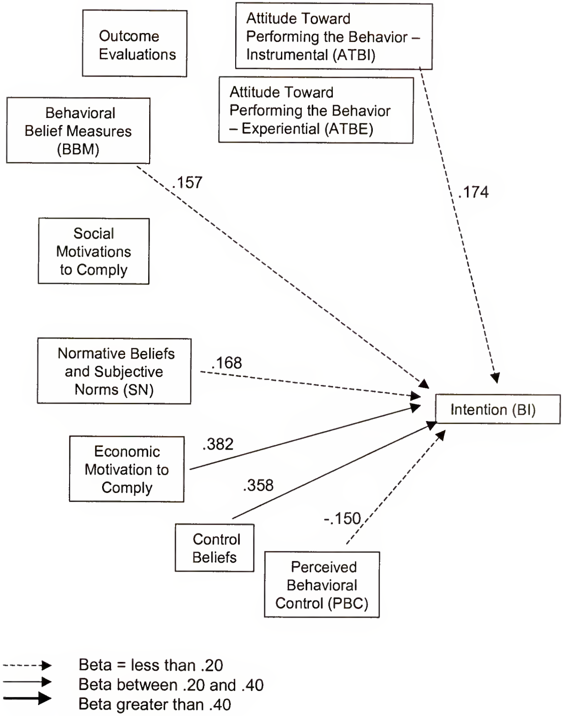

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
.157
.174
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
.168
Intention (BI)
Economic Motivation to Comply
.382
.358
-.150
Control Beliefs
Perceived Behavioral Control (PBC)
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.5 Beta Coefficients from Reduced Form Simplified TPB Model: Nonparticipants

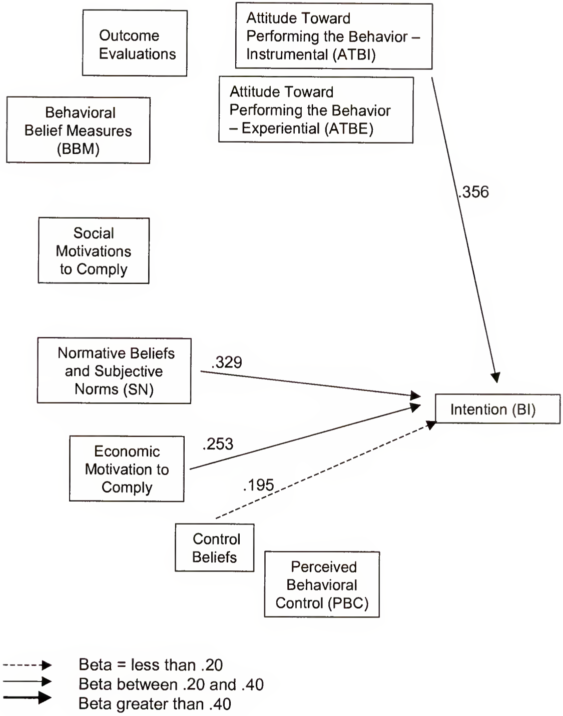

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
.356
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
.329
Intention (BI)
Economic Motivation to Comply
.253
.195
Control Beliefs
Perceived Behavioral Control (PBC)
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.6 Beta Coefficients from Reduced Form Simplified TPB Model: Participants

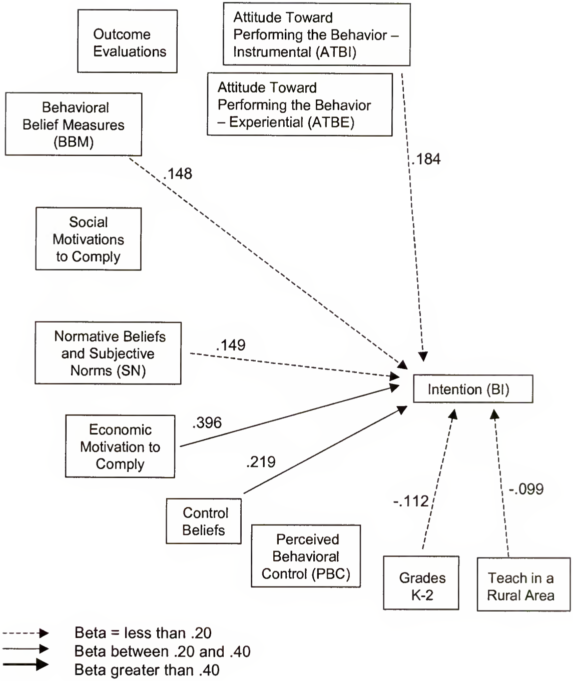

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
.184
.148
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
.149
Intention (BI)
Economic Motivation to Comply
.396
.219
-.112
-.099
Control Beliefs
Perceived Behavioral Control (PBC)
Grades K-2
Teach in a Rural Area
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.7 Beta Coefficients from Reduced Form Expanded TPB Model: Nonparticipants

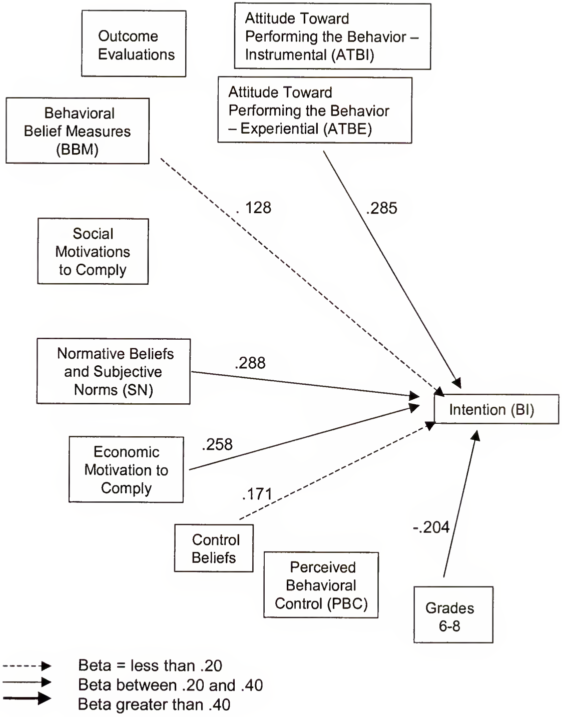

Outcome Evaluations
Attitude Toward Performing the Behavior – Instrumental (ATBI)
Attitude Toward Performing the Behavior – Experiential (ATBE)
Behavioral Belief Measures (BBM)
. 128
.285
Social Motivations to Comply
Normative Beliefs and Subjective Norms (SN)
.288
Intention (BI)
Economic Motivation to Comply
.258
.171
Control Beliefs
-.204
Perceived Behavioral Control (PBC)
Grades 6-8
Beta = less than .20
Beta between .20 and .40
Beta greater than .40

Figure 5.8 Beta Coefficients from Reduced Form Expanded TPB Model: Participants

CHAPTER 6
TEACHERS: CHANGE AGENTS FACE CHALLENGES TO PROMOTE AGRICULTURAL LITERACY

This chapter addresses several additional questions that were posed in the first Chapter. These questions fall outside the framework of the Theory of Planned Behavior (TPB) and concern other aspects of teachers' attitudes, perceptions, and awareness of agriculture and agricultural education. The chapter also presents a discussion of the context within which teachers work and make decisions about the curriculum they use in their classrooms.

Teachers' perceptions about agricultural education

Two measures of teachers' perception of agricultural education were derived from the survey. The first comprises the set of five questions that asked teachers about "Teaching about agriculture."[1] Teachers' overall perception of teaching about agriculture in general was indicated by the mean of their responses on these five survey questions. Chronbach's alpha coefficient for these questions was .95.

Positive perceptions of "Teaching about agriculture" were defined by a mean on these five items of less than 4.0, the neutral response on the survey scale. Negative perceptions of "Teaching about agriculture" were defined by a mean of 4.0 or higher. T-tests were used to identify demographic variables that differed significantly between teachers with positive perceptions and those with negative perceptions. Although some of the demographic variables were not normally distributed (in fact, some are categorical), a t-test will identify significant differences between the two groups.

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[1] These items are 7.1a-7.1e in the survey (see Appendix A).

Table 6.1 identifies three variables that were significantly related to perceptions of teaching about agriculture. Years of teaching experience, in total and in Florida, and teaching in a rural location were associated with positive agricultural perceptions. That is, more experienced teachers held more positive perceptions and, less surprisingly, teachers in rural locations held positive perceptions of agriculture. No other demographic variables significantly differed between those with positive and those with negative perceptions of agriculture.

Shifting to teachers' perceptions of "My teaching agricultural education concepts," the second measure of perception included the five items that asked teachers about "My teaching agricultural education concepts."[2] Again, the mean of teachers' responses on these five survey questions measured perceptions of their own teaching of agriculture rather than teaching by others or in general. Chronbach's alpha coefficient for these questions was .89.

Positive perceptions of "My teaching agricultural education concepts" were defined by a mean on these five items of less than 4.0, the neutral response on the survey scale. Negative perceptions of "My teaching agricultural education concepts" were defined by a mean of 4.0 or higher. It is noteworthy that 44 teachers held negative perceptions of their own teaching of agricultural education concepts, more than twice the number (17) who held negative perceptions of teaching about agriculture in general.

In comparison with perceptions about teaching about agriculture in general (Table 6.1), more variables were related to perceptions of "My teaching agricultural education concepts" (Table 6.2). Those with positive perceptions of agricultural education included teachers at the K-2 and 3-5 grade levels, teachers who reported spending more time planning their lessons, and, once again, those who teach in rural areas. Those with negative perceptions of agricultural education included high school teachers and those who teach in urban areas. The data in Tables 6.1 and 6.2 suggest that there are two groups of teachers who hold positive perceptions of teaching about agriculture. When posed the question of whether they would teach agricultural education concepts, a splinter group responded negatively. In any event, the vast majority of teachers (80.3%) hold positive perceptions about their teaching about agricultural concepts.

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[2] These items are 2a-2e.

Teachers' Attitudes About Their Competency to Teach Agricultural Curricula

The survey included five survey items that asked teachers about their "Confidence about agriscience topics."[3] Positive perceptions of "Confidence about agriscience topics" were defined by a mean on these five items of less than 4.0, the neutral response on the survey scale. Negative perceptions of "Confidence about agriscience topics" were defined by a mean of 4.0 or higher. Chronbach's alpha coefficient for these items was .93.

Table 6.3 reports the T-tests for positive and negative means in confidence for demographic variables in the study. Not surprisingly, those with higher levels of confidence about agricultural topics have rural ties. Those currently teaching in rural areas held more positive perceptions about their own confidence about agricultural science and teaching about agriculture. Teachers with a greater number of years of experience also reported higher confidence than did those with less experience. Nearly the same number of teachers (20) had low confidence about agriscience topics as the number (17) who held negative perceptions of teaching about agriculture.

One interpretation about the significance of teaching experience on positive attitudes of teaching about agriculture and confidence about agriscience concepts is that more- experienced teachers were also more skilled working with curriculum infusion within the mandatory instructional framework. That is, even though subject and grade level expectations are specified, experienced teachers know how to incorporate new content, such as agricultural topics, into the required curriculum. Additional support for the integration of agricultural literacy is shown by evidence of improved skill acquisition, especially in science and mathematics (Mabie & Baker, 1996; Conroy & Walker, 1998).

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[3] These items are 6a-6e.

Prior Knowledge of Agriculture and Attitudes

This research question considers whether teachers' prior knowledge about agriculture influenced their attitudes toward attending agricultural education workshops.[4] Positive perceptions of "Attending a Florida Agriculture in the Classroom workshop" were defined by a mean on these five items of less than 4.0, the neutral response on the survey scale, and negative perceptions of "Attending a Florida Agriculture in the Classroom workshop" were defined by a mean of 4.0 or higher. Chronbach's alpha coefficient for these items was .98. To answer this research question, FAITC participants are analyzed separately from nonparticipants because the participants, having already attended an FAITC workshop, might have a more positive attitude toward attending a hypothetical future workshop. Indeed, more participants held positive perceptions about attending an FAITC workshop (88.3%), than did nonparticipants, only 77.8% of whom had positive attitudes toward attending an FAITC workshop.

Table 6.4 shows that, among the nonparticipants, two groups hold significantly positive attitudes toward attending an FAITC workshop: teachers of grades K-2 and those pursuing an advanced degree. Among FAITC participants, the K-2 teachers are joined by those who were raised on a farm or ranch and those who teach in rural areas. None of the other variables were significant in distinguishing between those with positive and those with negative attitudes towards attending a workshop. In general, teachers who worked at rural schools stand out as the group with the most positive attitude towards FAITC workshops.

Attitudes toward attending an FAITC workshop were strongly associated with teachers' perceptions of "My teaching agricultural education concepts." Table 6.5 shows that almost half of those with negative attitudes toward attending a workshop also hold negative perceptions about their own teaching of agricultural concepts.

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[4] The survey items on this issue are 7.2a-7.2e.

Demographic Differences between Participants and Nonparticipants

The participants in FAITC workshops, it will be recalled from Table 4.5, were not typical of Florida's teachers. They were far more likely to teach in the elementary grades (K-5) and less likely to teach in high school. They also were somewhat more experienced than the average Florida teacher. Participants also differed from nonparticipants in other ways. Those with an agricultural background also were significantly over-represented in FAITC workshops (Table 6.6). Three variables support this conclusion: teachers raised on a farm or ranch, those who teach in a rural area, and former members of 4-H and/or FFA were significantly more likely to be FAITC workshop participants. Finally, workshop participants reported to spend significantly more time on lesson planning per week.

Information Channels

Some insights into school structure and organization come from information gained by asking teachers how information traveled into their district and school site and to the individual teachers. Teachers reported receiving workshop information through different means of communication (Figure 6.1). Over 80% of the respondents indicated that they received information about workshops from direct-mail flyers or school administrators. However, some sources are infrequently used to learn of workshop opportunities. Less than 50% of the respondents received the information through faculty orientations (49.6%), and even fewer (40.4%) learned about workshops from an Internet web site. The evidence shows that teachers relied heavily on traditional forms of communication within schools or from their peer networks.

Conclusion

The analyses in this chapter complement the findings presented in Chapter 5. This chapter shows that most teachers support including agricultural content in their school's mainstream curricula, but fewer see themselves as the one to teach about agriculture. It is clear that only teachers in rural schools have widespread positive views about agricultural education, while those in urban and suburban areas have more mixed perceptions, confidence, and attitudes toward workshops.

Table 6.1 Means (and Standard Deviations) of Demographic Variables by Perceptions of "Teaching about Agriculture"

Variable		Positive Perceptions of Ag Ed	Negative Perceptions of Ag Ed	t-value (Independent Samples t Test)
Number of Years Teaching Experience		16.23 (10.20)	10.62 (9.24)	2.19*
Number of Years Teaching in Florida		13.89 (9.42)	9.79 (9.18)	1.72+
Raised on farm or ranch		0.16 (0.36)	0.12 (0.33)	0.41
Grade-level:	K-2	0.36 (0.48)	0.35 (0.49)	0.04
	3-5	0.38 (0.49)	0.35 (0.49)	0.20
	6-8	0.26 (0.44)	0.29 (0.47)	0.27
	9-12	0.20 (0.40)	0.12 (0.33)	0.86
Number of workshops yearly		4.43 (3.69)	4.47 (3.25)	0.04
Pursuing advanced degree		0.18 (0.39)	0.18 (0.39)	0.04
Work with student interns		0.40 (0.49)	0.41 (0.51)	0.11
Hours per week planning lessons		2.40 (0.91)	2.29 (1.10)	0.44
Teach in:	Urban area	0.30 (0.46)	0.41 (0.51)	0.97
	Suburban	0.43 (0.50)	0.53 (0.51)	0.77
	Rural	0.26 (0.44)	0.06 (0.24)	1.89+
Percentage of students on free or reduced lunch		56.53 (30.08)	66.65 (30.46)	1.32
Former member of 4-H/FFA		0.21 (0.40)	0.006 (0.24)	1.46
Number of respondents (n)		201	17	

** Significant at .01 or higher; * significant at .05; + significant at .10.

Table 6.2 Means (and Standard Deviations) of Demographic Variables, Perceptions of "My Teaching Agricultural Education Concepts"

Variable		Positive Perceptions of Ag Ed	Negative Perceptions of Ag Ed	t-value (Independent Samples t Test)
Number of Years Teaching Experience		15.62 (10.33)	17.00 (10.09)	0.80
Number of Years Teaching in Florida		13.46 (9.45)	15.00 (10.06)	0.96
Raised on farm or ranch		0.17 (0.37)	0.009 (0.29)	1.22
Grade-level:	K-2	0.39 (0.49)	0.23 (0.42)	1.97*
	3-5	0.41 (0.49)	0.20 (0.41)	2.53*
	6-8	0.28 (0.45)	0.25 (0.44)	0.39
	9-12	0.16 (0.36)	0.36 (0.49)	3.15**
Number of workshops yearly		4.54 (3.75)	3.98 (3.21)	0.92
Pursuing advanced degree		0.17 (0.38)	0.20 (0.41)	0.54
Work with student interns		0.39 (0.49)	0.43 (0.50)	0.49
Hours per week planning lessons		2.47 (0.90)	2.07 (1.00)	2.50*
Teach in:	Urban area	0.28 (0.45)	0.43 (0.50)	1.97*
	Suburban	0.43 (0.50)	0.55 (0.50)	1.38
	Rural	0.28 (0.45)	0.002 (0.15)	3.78**
Percentage of students on free or reduced lunch		57.80 (29.42)	53.97 (32.97)	0.71
Former member of 4-H/FFA		0.22 (0.41)	0.11 (0.32)	1.57
Number of respondents (n)		179	44	

** Significant at .01 or higher; * significant at .05; + significant at .10.

Table 6.3 Means (and Standard Deviations) of Demographic Variables by "Confidence About Agriscience Topics"

Variable		Positive Degree of Confidence	Negative Degree of Confidence	t-value (Independent Samples t Test)
Number of Years Teaching Experience		16.23 (10.11)	10.20 (9.96)	2.55*
Number of Years Teaching in Florida		13.98 (9.46)	9.70 (10.01)	1.92+
Raised on farm or ranch		0.17 (0.37)	0.005 (0.22)	1.38
Grade-level:	K-2	0.37 (0.48)	0.20 (0.41)	1.50
	3-5	0.38 (0.49)	0.30 (0.47)	0.69
	6-8	0.26 (0.44)	0.40 (0.50)	1.31
	9-12	0.18 (0.39)	0.30 (0.47)	1.28
Number of workshops yearly		4.50 (3.77)	4.00 (2.44)	0.58
Pursuing advanced degree		0.17 (0.38)	0.20 (0.41)	0.30
Work with student interns		0.40 (0.49)	0.25 (0.44)	1.35
Hours per week planning lessons		2.38 (0.91)	2.25 (1.07)	0.61
Teach in:	Urban area	0.29 (0.46)	0.45 (0.51)	1.45
	Suburban	0.44 (0.50)	0.50 (0.51)	0.47
	Rural	0.26 (0.44)	0.005 (0.22)	2.09*
Percentage of students on free or reduced lunch		56.58 (30.09)	63.17 (31.28)	0.88
Former member of 4-H/FFA		0.21 (0.41)	0.10 (0.31)	1.15
Number of respondents (n)		198	20	

** Significant at .01 or higher; * significant at .05; + significant at .10.

Table 6.4 Means (and Standard Deviations) of Demographic Variables by "Attitude towards Attending a Florida Agriculture in the Classroom Workshop"

Variable		Positive Attitude toward Workshop	Negative Attitude toward Workshop	t-value (Independent Samples t Test)
		Nonparticipants		
Number of Years Teaching		14.81 (10.93)	14.50 (9.71)	0.14
Number of Years Teaching in Florida		12.56 (9.74)	13.21 (9.70)	0.32
Raised on farm or ranch		0.12 (0.33)	0.01 (0.26)	0.77
Grade-level:	K-2	0.41 (0.49)	0.18 (0.39)	2.26*
	3-5	0.29 (0.45)	0.25 (0.44)	0.37
	6-8	0.19 (0.40)	0.29 (0.46)	1.04
	9-12	0.21 (0.41)	0.32 (0.48)	1.17
Number of workshops yearly		4.28 (2.96)	3.64 (3.17)	0.99
Pursuing advanced degree		0.21 (0.41)	0.01 (0.27)	1.67+
Work with student interns		0.39 (0.49)	0.39 (0.50)	0.05
Hours per week planning lessons		2.30 (0.88)	2.29 (1.15)	0.08
Teach in:	Urban area	0.44 (0.50)	0.36 (0.49)	0.77
	Suburban	0.45 (0.50)	0.57 (0.50)	1.14
	Rural	0.11 (0.32)	0.007 (0.26)	0.62
Percentage of students on free or reduced lunch		55.28 (32.30)	53.92 (31.66)	0.19
Former member of 4-H/FFA		0.12 (0.33)	0.007 (0.26)	0.75
Number of respondents (n)		98	28	
		Participants		
Number of Years Teaching		17.09 (9.68)	14.95 (10.23)	0.68
Number of Years Teaching in Florida		14.68 (9.33)	12.32 (7.82)	0.80
Raised on farm or ranch		0.23 (0.42)	0.00 (0.00)	1.79+
Grade-level:	K-2	0.37 (0.49)	0.01 (0.30)	1.87+
	3-5	0.49 (0.50)	0.64 (0.50)	0.88
	6-8	0.36 (0.48)	0.27 (0.47)	0.57
	9-12	0.14 (0.35)	0.01 (0.30)	0.48
Number of workshops yearly		4.87 (4.59)	3.90 (1.71)	0.66
Pursuing advanced degree		0.18 (0.39)	0.01 (0.30)	0.75
Work with student interns		0.40 (0.49)	0.45 (0.52)	0.36
Hours per week planning lessons		2.58 (0.91)	2.18 (0.75)	1.37
Teach in:	Urban area	0.16 (0.37)	0.18 (0.40)	0.21
	Suburban	0.36 (0.48)	0.64 (0.50)	1.76+
	Rural	0.47 (0.50)	0.18 (0.40)	1.82+
Percentage of students on free or reduced lunch		60.91 (27.26)	60.00 (26.99)	0.09
Former member of 4-H/FFA		0.30 (0.46)	0.18 (0.40)	0.84
Number of respondents (n)		83	11	

** Significant at .01 or higher; * significant at .05; + significant at .10.

Table 6.5 Mean Attitude towards Attending a Florida Agriculture in the Classroom Workshop versus Perception of "My Teaching Agricultural Education Concepts" and Suburban Location

	Positive Attitudes towards Attending an FAITC Workshop	Negative Attitudes towards Attending an FAITC Workshop
Positive Perception of "My Teaching Agricultural Education Concepts" (Mean 5-item response less than 4.0)	157 (87%)	19 (51)
Negative Perception of "My Teaching Agricultural Education Concepts" (Mean 5-item response equal to or greater than 4.0)	23 (13%)	18 (49%)
Total	180 (100%)	37 (100%)

Chi-Square = 25.770** (significant at the .01 level).

Table 6.6 Means (and Standard Deviations) of Demographic Variables for FAITC Participants and Nonparticipants

Variable		Participants	Non-participants	t-value (Independent Samples t Test) (p value in parentheses)
Number of Years Teaching Experience		15.00 (10.53)	17.15 (9.72)	1.58 (.116)
Years Teaching in Florida		14.79 (9.28)	12.77 (9.73)	1.59 (.114)
Raised on farm or ranch		20.6%	12.1%	1.75 (.082)+
Grade-level:	K-2	27.1%	32.4%	0.12 (.908)
	3-5	37.2%	25.5%	3.43 (.001)**
	6-8	25.6%	20.0%	2.07 (.039)*
	9-12	10.1%	22.1%	2.02 (.044)*
Number of workshops yearly		4.78 (4.31)	4.10 (3.02)	1.40 (.164)
Pursuing advanced degree		16.7% (37.0)	17.4% (38.0)	0.15 (.881)
Work with student interns		41.2% (49.0)	38.3% (49.0)	0.44 (.660)
Hours per week planning lessons		2.53 (0.89)	2.30 (0.95)	1.87 (.062)+
Teach in:	Urban area	15.5% (3.6)	41.4% (49.0)	4.37 (.000)**
	Suburban	40.2% (49.0)	47.4% (5.0)	1.08 (.282)
	Rural	43.3% (50.0)	11.3% (32.0)	5.94 (.000)**
Percentage of students on free or reduced lunch		61.41 (26.95)	55.70 (32.43)	1.33 (.184)
Former member of 4-H/FFA		30.2% (46.0)	12.0% (33.0)	3.49 (.001)**
Number of respondents (n)		97 (42.2%)	133 (57.8%)	230 (100%)

** Significant at .01 or higher; * significant at .05; + significant at .10 .

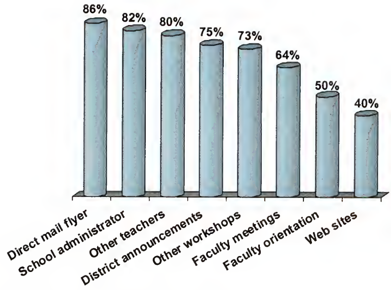

Figure 6.1 Sources of Information about Workshop Opportunities

CHAPTER 7
CONCLUSIONS AND RECOMMENDATIONS

This study has looked at two distinctly different groups of teachers, previous FAITC workshop participants versus nonparticipants, to identify reasons why some participated and others did not participate in workshops aimed at providing agricultural curricula. This dissertation incorporated the Theory of Planned Behavior (TPB) as the theoretical framework for structure and analysis of this issue.

This chapter summarizes the main findings of the study. Then, recommendations for programmatic changes in FAITC, and recommendations for future research on agriculturally-related curricula are suggested. Finally, some thoughts about how to improve agricultural literacy are presented.

Summary of Findings

The TPB model was selected from education, psychology, and agricultural education literature because of previous evidence about its utility and it was appropriate for the selected population of the study. The model has been used in many contexts in a wide variety of disciplines. In a series of studies, Parker and her colleagues (1992; 1995; 1998) have expanded the TPB model to include demographic variables together with TPB constructs. This approach was implemented in this study.

The relationships among the many TPB constructs, detailed in Chapter 5, suggest that previous FAITC workshop participants have strongly held attitudes surrounding their choices of future workshops. Those who have not yet participated in an FAITC workshop, on the other hand, appear to be affected more by the opinions and values, as well as authority, of others, such as administrators, colleagues, and students' parents. In addition, both groups were strongly influenced by the prospective payment of a stipend. As previously noted, teachers expect to obtain compensation for costs associated with attending workshops. School level and location were significant demographic predictors, with high school teachers and urban/suburban teachers less likely to be participants.

In Chapter 6, analyses revealed that the teacher groups found to be more favorable about agricultural education had rural influences or backgrounds or were teachers of elementary grades. By contrast, more teachers in urban areas and high school teachers (grades 9-12) hold negative perceptions of agricultural education and have little confidence in teaching about it. These specific demographic identifiers point toward which teacher groups to target for enhancing agricultural literacy. In other words, when teachers were asked for their perceptions of teaching about agriculture, this was rated quite differently than when asked about the more personalized idea of "my teaching" about agriculture. Teachers responses also showed a strong correlation between rural connections and having higher confidence about "my teaching" agriscience.

Limitations of the Study: Non-Response Error

Non-response error is a common problem in survey research, and particularly mail surveys (Israel, 1992b). In this study, non-response was greater among FAITC participants (Table 4.4). The fact that FAITC participants exhibit a lower response rate (25.2% than do nonparticipants (32.8%) suggests that FAITC participants have been faced with "respondent fatigue" from repeated surveys since their workshop or other FAITC participation. The recommended solution for non-response is to "double-dip" – to contact by telephone a random sample of non-respondents (e.g., at least 20 of them) and to compare their responses to those of the original respondents. If the responses of the non-respondents are significantly different from those of the original respondents, then there are questions about the external validity of the study (Ary et al., 1996).

The response rate in this study (29.1%) is low compared to most survey studies in agricultural education. Lindner et al. (2001) studied 304 articles that used surveys and were published in the *Journal of Agricultural Education* during the 1990s. Only 4.6% of the articles had response rates below 50%. This study, unlike those in their research, included all teachers rather than a select group of those connected with agricultural education. As the results discussed in Chapter 6 have shown, teachers in Florida have relatively negative attitudes toward agricultural topics. One might expect that teachers with even more negative attitudes simply discarded, rather than responded to, the survey when opened.

Given the low response rate and associated bias, grade level, school location and years of teaching experience were included in the analysis as co-variates to allow the unbaised estimation of parameters for TPB constructs. Years of teaching experience showed no significant effect in the regression models while grade level and location were significant. The effects of control beliefs, subjective norms, and other TPB constructs are net of these demographic variables but the former could be biased by other unmeasured variables which contributed to nonresponse.

Programmatic Recommendations for FAITC

Many factors can enhance or impede the long-term goal of improved agricultural literacy for teachers, students, and American society as a whole. To raise agricultural literacy and awareness in the populace, agricultural educators must meet the challenges by starting with teachers and future educators. Initial attempts at offering agricultural literacy workshops have barely broken into the general education profession.

Participants indicated that their participation was greatly influenced by receiving a direct mail flyer, by the endorsements from school administrators, other teachers, and opportunities to gain new ideas applicable for teaching mandated curricula effectively. These communication methods can be adopted by FAITC to encourage greater teacher participation in workshops and use of the FAITC curricula in classrooms.

The results suggest that many teachers are strongly influenced by their administrators, including principals and curriculum coordinators. These influentials also have more power over teachers' decisions than students' parents, colleagues, or other important people. To encourage teachers to attend workshops, then, FAITC could target administrators to help promote agricultural education. FAITC could develop messages for administrators that emphasize the benefits for students (especially in regard to laying the foundation for success in tested content), the need to empower teachers to make decisions, and expressing support for teachers through a commitment to approve requests for attending FAITC workshops.

FAITC also could involve successful teachers in promotional activities and messages. The FAITC program has, for example, sponsored an annual "Ag-Teacher of the Year" program. These teachers have submitted documentation along with personal testimonies about the effectiveness of the FAITC Program, value of the integrated curricula, and strategies of how best to integrate the content. These teachers would be influential representatives and role models for establishing a positive subjective norm toward infusion of agricultural education materials.

Findings from this dissertation point to weak interest and unfavorable perceptions held by many teachers about improving agricultural awareness and literacy. However, they have positive perceptions about biological, environmental and science topics. The challenge for agricultural education is to illustrate that agriculture is, in fact, biological and environmental science through FAITC's promotional communications and training workshops. Such messages must highlight that modern agriculture is an advanced technological science. That is, this highly sophisticated industry incorporates principles of the physical, chemical and biological sciences for advancement of the food and fiber system. Dailey et al. (2001) suggests that content integration with explicit instruction in problem-solving strategies improved both retention and transfer of knowledge and skills. Research has shown that using agriculture improves the acquisition of basic science and math process skills, at least as proven in elementary settings (Mabie & Baker, 1996). Thus, the skills learned through infusion of agricultural education can support the development of those measured by mandates testing while, at the same time benefitting students.

Teachers reported that they attend workshops to gain new ideas and learn about topics that will help their students (Table 7.1). The problem faced by agricultural educators is that agriculture, or career options related to agriculture, are not perceived as important or helpful for students. FAITC could develop messages that emphasize the availability of new ideas for hands-on classroom activities and students' interest and learning associated with these activities. In addition, FAITC workshops need to be advertised through the information channels that are frequently used by teachers, such as direct mail flyers, district announcements, and information sent to school administrators. FAITC's web site could be featured within a module within workshops that would enhance teachers' use of internet resources.

Finally, we know that teachers can be true change agents to implement educational change. Therefore, several recommendations can be made to increase teahcers' preparation for agricultural education. This might include: 1) establishing greater linkages between the Colleges of Agriculture and Education, 2) inserting FAITC workshops into collegiate classrooms to prepare future educators for incorporating agricultural literacy in their own classrooms, 3) involving experienced teachers to model curricular integration and demonstrate exemplary teaching, 4) incorporating agriculturally-related internet resources and web links into pre-intern teachers' computer classes, and 5) developing a linkage with undergraduate science courses and career awareness counselors to enhance a focus on the full spectrum of career potential related to agricultural sciences.

Recommendations for Further Research

In the TPB model, external factors are downplayed, represented by only two of the seven influences on intention and behavior – i.e. perceived behavioral control and actual behavioral control. Internal factors, by contrast, are emphasized, represented by behavioral, normative and control beliefs, attitudes and subjective norms. Constrained behaviors, such as those in work-related situations, have not been incorporated into the TPB, as the literature reviewed in Chapter 3 indicates. Teachers face a number of intervening external factors, such as authority (principals and curriculum coordinators), legal requirements (such as recertification and mandatory student testing), and competing monetary incentives to participate in various workshops.

Further research on agricultural literacy and how to develop the program into a larger organization with more resources, staff, and greater visibility would help focus the efforts of FAITC and its sibling AITC programs in other states. More research is needed into how to get the curricula woven into standards at the national and state level. In this way, the priorities of all school districts and every school would include agriculture.

Regarding the pragmatic methodological details for follow-up research of this type several changes would be appropriate. First, the questions regarding teaching and learning philosophies need to be made distinct from those used in the present survey. Asking about using hands-on teaching strategies was meant to directly measure teacher attitudes about constructivism in practice. This issue, an important one in praxis, was not explored in depth in this study. Second, teachers with advanced degrees were not taken into account in this study, because the question concerning advanced degrees asked if teachers were pursuing an advanced degree, not whether they already hold an advanced degree. Having an advanced degree (and other demographic attributes not included) might be important antecedents to the effects found for TPB constructs in this study.

Finally, follow-up research on the implementation of changes made to undergraduate studies, especially using curricular integration, will direct future and promising research efforts for the enhancement of agricultural literacy.

Table 7.1 Ranking of Responses to "How important are the following reasons you attend workshops?"

Nonparticipants	Participants
New Ideas	New Ideas
Topic will help my students	Topic will help my students
Professional development	Professional development
Personal interest	Personal interest
Recertification	Free Materials
FCAT strategies	FCAT strategies
Free Materials	Advice of other teachers
Advice of other teachers	Recertification
Colleagues attend too	Colleagues attend too

APPENDIX A
SURVEY

UNIVERSITY OF
FLORIDA
College of Agricultural and Life Sciences
IFAS

FLORIDA AGRICULTURAL CURRICULA FOR TEACHERS SURVEY

We are working with Florida Agriculture in the Classroom (FAITC) to develop curricula and workshops to help teachers educate Florida's youth about agriculture. The objective is to encourage agricultural literacy — agriculture, food, and fiber play an important role in our economy and society. Your responses are very important because they will help us deliver workshops that meet teachers' needs.

For the following questions, please answer by circling the words that most closely represent your opinions or feelings about the statement.

For example: **Florida's beaches are the best in the continental U.S.**

completely agree	[✓ *mostly agree*]	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

Part 1: For the following 5 questions, please answer by circling the words that most closely represent your opinions, or feelings about the statement.

a. In my teaching I cover agricultural education.

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

b. I am preparing students for agricultural careers.

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

c. I am preparing students for biological, environmental, and science careers.

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

d. The Florida Agriculture in the Classroom topics may interest my students.

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

e. Hands-on classroom activities are necessary for learning.

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

Part 2: This section asks about agricultural education. For the following 5 questions, the statements to which you are responding are the same. Please note that the responses are different.

a. My teaching agricultural education concepts is:

extremely good	*quite good*	*slightly good*	*neither*	*slightly bad*	*quite bad*	*extremely bad*

b. **My teaching agricultural education concepts is:**

extremely useful	*quite useful*	*slightly useful*	*neither*	*slightly useless*	*quite useless*	*extremely useless*

c. **My teaching agricultural education concepts is:**

extremely appealing	*quite appealing*	*slightly appealing*	*neither*	*slightly unappealing*	*quite unappealing*	*extremely unappealing*

d. **My teaching agricultural education concepts is:**

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

e. **My teaching agricultural education concepts is:**

extremely beneficial	*quite beneficial*	*slightly beneficial*	*neither*	*slightly harmful*	*quite harmful*	*extremely harmful*

Part 3: This section asks about careers. For the following 5 questions, the statements to which you are responding are the same. Please note that the responses are different.

a. **Preparing my students for agricultural careers is:**

extremely good	*quite good*	*slightly good*	*neither*	*slightly bad*	*quite bad*	*extremely bad*

b. **Preparing my students for agricultural careers is:**

extremely desirable	*quite desirable*	*slightly desirable*	*neither*	*slightly undesirable*	*quite undesirable*	*extremely undesirable*

c. **Preparing my students for agricultural careers is:**

extremely valuable	*quite valuable*	*slightly valuable*	*neither*	*slightly worthless*	*quite worthless*	*extremely worthless*

d. **Preparing my students for agricultural careers is:**

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite likely*	*extremely likely*

e. **Preparing my students for agricultural careers is:**

extremely beneficial	*quite beneficial*	*slightly beneficial*	*neither*	*slightly harmful*	*quite harmful*	*extremely harmful*

Part 4: Please respond about preparing students for these careers. For the following 5 questions, the statements to which you are responding are the same. Please note that the responses are different.

a. **Preparing students for biological, environmental, and science careers is:**

extremely good	*quite good*	*slightly good*	*neither*	*slightly bad*	*quite bad*	*extremely bad*

b. **Preparing students for biological, environmental, and science careers is:**

extremely desirable	*quite desirable*	*slightly desirable*	*neither*	*slightly undesirable*	*quite undesirable*	*extremely undesirable*

c. **Preparing students for biological, environmental, and science careers is:**

extremely useful	*quite useful*	*slightly useful*	*neither*	*slightly useless*	*quite useless*	*extremely useless*

d. **Preparing students for biological, environmental, and science careers is:**

extremely appealing	*quite appealing*	*slightly appealing*	*neither*	*slightly unappealing*	*quite unappealing*	*extremely unappealing*

e. **Preparing students for biological, environmental, and science careers is:**

extremely beneficial	*quite beneficial*	*slightly beneficial*	*neither*	*slightly harmful*	*quite harmful*	*extremely harmful*

Part 5: Please respond about hands-on classroom activities. For the following 5 questions, the statements to which you are responding are the same. Please note that the responses are different.

a. **Using hands-on classroom activities for learning is:**

extremely good	*quite good*	*slightly good*	*neither*	*slightly bad*	*quite bad*	*extremely bad*

b. **Using hands-on classroom activities for learning is:**

extremely desirable	*quite desirable*	*slightly desirable*	*neither*	*slightly undesirable*	*quite undesirable*	*extremely undesirable*

c. **Using hands-on classroom activities for learning is:**

extremely useful	*quite useful*	*slightly useful*	*neither*	*slightly useless*	*quite useless*	*extremely useless*

d. **Using hands-on classroom activities for learning is:**

extremely appealing	*quite appealing*	*slightly appealing*	*neither*	*slightly unappealing*	*quite unappealing*	*extremely unappealing*

e. **Using hands-on classroom activities for learning is:**

extremely wise	*quite wise*	*slightly wise*	*neither*	*slightly unwise*	*quite unwise*	*extremely unwise*

Part 6: This section is about agriscience topics. For the following 5 questions, the statements to which you are responding are the same. Please note that the responses are different.

a. **To be confident about agriscience topics is:**

extremely good	*quite good*	*slightly good*	*neither*	*slightly bad*	*quite bad*	*extremely bad*

b. **To be confident about agriscience topics is:**

extremely desirable	*quite desirable*	*slightly desirable*	*neither*	*slightly undesirable*	*quite undesirable*	*extremely undesirable*

c. **To be confident about agriscience topics is:**

extremely appealing	*quite appealing*	*slightly appealing*	*neither*	*slightly unappealing*	*quite unappealing*	*extremely unappealing*

d. **To be confident about agriscience topics is:**

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

e. **To be confident about agriscience topics is:**

extremely beneficial	*quite beneficial*	*slightly beneficial*	*neither*	*slightly harmful*	*quite harmful*	*extremely harmful*

Part 7: The next few questions ask you to tell how you feel about agricultural education and attending a workshop on this topic. Please circle the number that best indicates your response.

1. I think teaching about agriculture is:

a. good	1	2	3	4	5	6	7	bad
b. desirable	1	2	3	4	5	6	7	undesirable
c. valuable	1	2	3	4	5	6	7	worthless
d. appealing	1	2	3	4	5	6	7	unappealing
e. useful	1	2	3	4	5	6	7	useless

2. My attitude towards attending a Florida Agriculture in the Classroom workshop is:

a. good	1	2	3	4	5	6	7	bad
b. desirable	1	2	3	4	5	6	7	undesirable
c. valuable	1	2	3	4	5	6	7	worthless
d. appealing	1	2	3	4	5	6	7	unappealing
e. useful	1	2	3	4	5	6	7	useless

Part 8: Please circle the answer that best indicates your response.

a. **Most people who are important to me think I should attend a workshop on agricultural education within the next year.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

b. **My principal expects me to attend a Florida agriculture in the Classroom workshop within the next year.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

c. **My curriculum coordinators think I should attend a workshop within the next year on new agriscience concepts to use in my classroom.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

d. **My students' parents think I should attend an agricultural education workshop within the next year.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

e. **It is expected of me that I attend an agricultural education workshop within the next year.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

Part 9: Please answer the following questions by circling the words that most closely represent your opinions, attitudes, or feelings.

a. **Generally speaking, I want to do what other important people think I should do.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

b. **Generally speaking, I want to do what my principal thinks I should do.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

c. **Generally speaking, I want to do what my curriculum coordinator thinks I should do.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

d. **Generally speaking, I want to do what my students' parents think I should do.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

e. **Generally speaking, I want to do what my fellow teachers think I should do.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

Part 10: Please answer the following questions by circling the words that most closely represent your opinions, attitudes or feelings.

a. **I have control over whether I attend an agricultural education workshop within the next year.**

definitely true	*quite true*	*slightly true*	*neither*	*slightly untrue*	*quite untrue*	*definitely untrue*

b. **If I wanted to, I could attend an agricultural education workshop within the next year.**

definitely true	*quite true*	*slightly true*	*neither*	*slightly untrue*	*quite untrue*	*definitely untrue*

c. **It is up to me whether I attend an agricultural education workshop within the next year.**

definitely true	*quite true*	*slightly true*	*neither*	*slightly untrue*	*quite untrue*	*definitely untrue*

d. **If I wanted to, I could teach about topics related to agriculture.**

completely agree	*mostly agree*	*slightly agree*	*neither*	*slightly disagree*	*mostly disagree*	*completely disagree*

e. **I decide when to use hands-on teaching methods.**

definitely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*definitely*
true	*true*	*true*		*untrue*	*untrue*	*untrue*

f. **If I wanted to, it would be easy for me to include some science content in my teaching.**

completely	*mostly*	*slightly*	*neither*	*slightly*	*mostly*	*completely*
agree	*agree*	*agree*		*disagree*	*disagree*	*disagree*

g. **For me to attend an agricultural education workshop within the next year is:**

extremely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*extremely*
likely	*likely*	*likely*		*unlikely*	*unlikely*	*unlikely*

h. **If I wanted to, it would be easy for me to attend an agricultural education workshop within the next year.**

definitely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*definitely*
true	*true*	*true*		*untrue*	*untrue*	*untrue*

i. **I feel in complete control over whether I attend an agricultural education workshop within the next year.**

definitely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*definitely*
true	*true*	*true*		*untrue*	*untrue*	*untrue*

Part 11: Please answer the following questions by circling the words that most closely represent your opinions, attitudes, or feelings about each statement.

a. **Supporting higher FCAT scores is _________.**

extremely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*extremely*
good	*good*	*good*		*bad*	*bad*	*bad*

b. **Only FCAT curriculum materials are appropriate for the subject that I teach.**

definitely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*definitely*
true	*true*	*true*		*untrue*	*untrue*	*untrue*

c. **Spending my time on content not included on the FCAT is ____________.**

extremely	*quite*	*slightly*	*neither*	*slightly*	*quite*	*extremely*
likely	*likely*	*likely*		*unlikely*	*unlikely*	*unlikely*

d. **I know a lot about Florida agriculture.**

completely	*mostly*	*slightly*	*neither*	*slightly*	*mostly*	*completely*
agree	*agree*	*agree*		*disagree*	*disagree*	*disagree*

e. **My level of knowledge about agricultural topics, such as biotechnology, is very limited.**

completely	*mostly*	*slightly*	*neither*	*slightly*	*mostly*	*completely*
agree	*agree*	*agree*		*disagree*	*disagree*	*disagree*

f. **Florida Agriculture in the Classroom will work with NASA to bring Space Agriculture to the classroom. Please indicate your level of interest in using Space Agriculture in the Classroom materials.**

very	*quite*	*slightly*	*neither*	*slightly*	*quite*	*very*
interested	*interested*	*interested*		*uninterested*	*uninterested*	*uninterested*

g. To what degree would your students be interested in Space Agriculture in the Classroom materials?

very interested	*quite interested*	*slightly interested*	*neither*	*slightly uninterested*	*quite uninterested*	*very uninterested*

h. What is the likelihood that you would use Space Agriculture in the Classroom materials?

very likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*somewhat unlikely*	*very unlikely*

Part 12: Please answer the following questions by circling the words that most closely represent your opinions, attitudes, or feelings about each statement.

a. I will try to attend an agricultural education workshop within the next year.

definitely true	*quite true*	*slightly true*	*neither*	*slightly untrue*	*quite untrue*	*definitely untrue*

b. I intend to attend an agricultural education workshop within the next year.

definitely true	*quite true*	*slightly true*	*neither*	*slightly untrue*	*quite untrue*	*definitely untrue*

c. I would attend an agricultural education workshop within the next year so that I can feel confident about teaching new information.

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

d. I would attend an agricultural education workshop within the next year if I received a stipend.

extremely likely	*quite likely*	*slightly likely*	*neither*	*slightly unlikely*	*quite unlikely*	*extremely unlikely*

Part 13: Please provide some information about yourself and your classroom

a. How many years of teaching experience do you have? __________ years

b. How many years have you taught in Florida? __________ years

c. Were you raised on a farm or ranch? Yes No

d. What grade level(s) do you teach? K-2 3-5 6-8 9-12

e. About how many teacher workshops do you attend yearly? _______ number of workshops

f. Are you now pursuing an advanced degree? Yes No

g. Do you work with student-teacher interns? Yes No

f. About how many hours each week do you spend planning you lessons?

1-3 hrs. 4-6 hrs. 6-10 hrs. 11-15 hrs. 15+ hrs.

g. What kind of area do you teach in?

urban suburban rural

h. **What percentage of your students are on the free or reduced lunch program?** ________ percent

i. **Have you attended an FAITC workshop?** Yes No Don't recall

j. **If you have attended an FAITC workshop, which curriculum was presented to you?**

Food, Land & People Keeping Florida Green Both Don't recall

k. **Were you invited to attend a workshop on agricultural literacy?** Yes No Don't recall

l. **Are you a former member of 4-H and/or FFA?** Yes No

m. **How important are the following reasons you attend workshops? (Circle an answer for each)**

	not at all important	slightly important	moderately important	very important	don't know
for recertification	1	2	3	4	9
to get new ideas	1	2	3	4	9
to gain FCAT strategies	1	2	3	4	9
for free materials	1	2	3	4	9
from the advice of other teachers	1	2	3	4	9
for personal interest	1	2	3	4	9
if the topic will help my students	1	2	3	4	9
when my colleagues attend too	1	2	3	4	9
for professional development	1	2	3	4	9

n. **How do you find out about workshop opportunities? (Please circle)**

School administrator	Yes	No	Web sites	Yes	No
Direct mail flyer	Yes	No	Faculty orientation	Yes	No
Other teachers	Yes	No	Faculty meetings	Yes	No
District Announcements	Yes	No	Other workshops	Yes	No

Thank you very much for your time and valuable responses!

APPENDIX B
RELIABILITY ANALYSIS OF SURVEY INSTRUMENT

The results of both the pilot survey and the final survey were entered into *SPSS for Windows* statistical software. The procedure Reliability Analysis (under Analyze => Scale) was run, using the Alpha model, and selecting Descriptive statistics, Item, Scale, and Scale if item deleted. The Chronbach's Alpha indices for the pilot questionnaire (n = 42 respondents) and the final survey (n = 230 respondents) are reported in Table B1. The Chronbach's Alpha coefficients for the final survey are all above the threshold level of 0.80, which indicates that the survey contained reliable questions.

Reduction of TPB constructs to three items also utilized Chronbach's alpha values, shown in Table B2.

Table B1. Chronbach's Alpha Coefficients for Pilot Survey and Final Survey

Survey Part or Section	Pilot survey (8 items per section)	Final survey (5 items per section)
Part 1	.73	.81
Part 2	.94	.89
Part 3	.95	.90
Part 4	.92	.92
Part 5	.86	.94
Part 6	.96	.93
Part 7, Sections 7.1 and 7.2 (Pilot part 1, questions 9 and 10)	Part 1, Item 9 = .95 Part 1, Item 10 = .96	Section 7.1 = .95 Section 7.2 = .98
Pilot Part 8	.98	--
Part 8 (Pilot part 9)	.93	.95
Part 9 (Pilot part 10)	.94	.90
Part 10 (Pilot part 11)	.87	.86
Part 11 (Pilot part 12)	.72	.86
Part 12 (Pilot part 13)	-.1.0	.94

Note: The questions in Part 7 of the pilot survey were eliminated from the final survey.

Table B2. Chronbach's Alpha Coefficients for TPB Constructs

	Original Constructs	
Construct	Participants	Non-Participants
Belief Based Measures (BBM)	.86	.84
Attitudes toward Behaviors Instrumental Measures (ATBI)	.86	.89
Attitudes toward Behaviors Experiential Measures (ATBE)	.85	.87
Normative Expectations (SN)	.94	.95
Social Pressures Motivations to comply (MC)	.90	.90
Behavioral Intent (BI)	.96	.94
Control Beliefs (Ctrl)	.69	.68
Perceived Behavioral Control (PBC)	.47	.63
Outcome Evaluation Measures (OEM)	.64	.70

Note: Economic Motivation to Comply (EconMC) was measured by a single item and was not included in this analysis.

APPENDIX C
SURVEY ITEMS, VARIABLE NAMES, AND THEORY OF PLANNED BEHAVIOR (TPB) CONSTRUCTS REPRESENTED

Table C1 Survey Items, Variable Names, and Theory of Planned Behavior (TPB) Constructs Represented

Item #	Variable Name	TPB Construct	Item
1a	TEACH_AE	BBM	In my teaching I cover agricultural education. *extremely likely - extremely unlikely*
1b	PREP_AGC	BBM	I am preparing students for agricultural careers. *completely agree - completely disagree*
1c	PREP_BIO	BBM	I am preparing students for biological, environmental, and science careers. *extremely likely - extremely unlikely*
1d	AITC_INT	BBM	The Florida Agriculture in the Classroom topics may interest my students. *extremely likely - extremely unlikely*
1e	HANDS_NC	BBM	Hands-on classroom activities are necessary for learning. *completely agree - completely disagree*
2a	MYTAE_EV	OEM	My teaching agricultural education concepts is: *extremely good - extremely bad*
2b	MYTAE_US	ATBE	My teaching agricultural education concepts is: *extremely useful - extremely useless*
2c	MYTAE_AP	ATBE	My teaching agricultural education concepts is: *extremely appealing - extremely unappealing*
2d	MYTAE_LK	BBM	My teaching agricultural education concepts is: *extremely likely - extremely unlikely*
2e	MYTAE_BN	ATBI	My teaching agricultural education concepts is: *extremely beneficial - extremely harmful*
3a	PRAGC_EV	OEM	Preparing my students for agricultural careers is: *extremely good - extremely bad*
3b	PRAGC_DE	ATBE	Preparing my students for agricultural careers is: *extremely desirable - extremely undesirable*
3c	PRAGC_VA	ATBE	Preparing my students for agricultural careers is: *extremely valuable - extremely worthless*
3d	PRAGC_LK	BBM	Preparing my students for agricultural careers is: *extremely likely - extremely likely*

Table C1. Continued

Item #	Variable Name	TPB Construct	Item
3e	PRAGC_BN	ATBI	Preparing my students for agricultural careers is: *extremely beneficial - extremely harmful*
4a	PRBIO_EV	OEM	Preparing students for biological, environmental, and science careers is: *extremely good - extremely bad*
4b	PRBIO_DE	ATBE	Preparing students for biological, environmental, and science careers is: *extremely desirable - extremely undesirable*
4c	PRBIO_US	ATBE	Preparing students for biological, environmental, and science careers is: *extremely useful - extremely useless*
4d	PRBIO_AP	ATBE	Preparing students for biological, environmental, and science careers is: *extremely appealing - extremely unappealing*
4e	PRBIO_BE	ATBI	Preparing students for biological, environmental, and science careers is: *extremely beneficial - extremely harmful*
5a	HANDS_EV	OEM	Using hands-on classroom activities for learning is: *extremely good - extremely bad*
5b	HANDS_DE	ATBE	Using hands-on classroom activities for learning is: *extremely desirable - extremely undesirable*
5c	HANDS_UE	ATBE	Using hands-on classroom activities for learning is: *extremely useful - extremely useless*
5d	HANDS_AP	ATBE	Using hands-on classroom activities for learning is: *extremely appealing - extremely unappealing*
5e	HANDS_WI	OEM	Using hands-on classroom activities for learning is: *extremely wise - extremely unwise*
6a	C_AGS_EV	OEM	To be confident about agriscience topics is: *extremely good - extremely bad*
6b	C_AGS_DE	ATBE	To be confident about agriscience topics is: *extremely desirable - extremely undesirable*
6c	C_AGS_AP	ATBI	To be confident about agriscience topics is: *extremely appealing - extremely unappealing*

Table C1. Continued

Item #	Variable Name	TPB Construct	Item
6d	C_AGS_LK	BBM	To be confident about agriscience topics is: *extremely likely - extremely unlikely*
6e	C_AGS_BN	ATBI	To be confident about agriscience topics is: *extremely beneficial - extremely harmful*
7.1a	T_AG_EV	OEM	I think teaching about agriculture is: *good - bad*
7.1b	T_AG_DE	ATBE	I think teaching about agriculture is: *desirable - undesirable*
7.1c	T_AG_VA	ATBE	I think teaching about agriculture is: *valuable - worthless*
7.1d	T_AG_AP	ATBI	I think teaching about agriculture is: *appealing - unappealing*
7.1e	T_AG_US	ATBE	I think teaching about agriculture is: *useful - useless*
7.2a	AT_WK_EV	OEM	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *good - bad*
7.2b	AT_WK_DE	ATBI	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *desirable - undesirable*
7.2c	AT_WK_VA	ATBI	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *valuable - worthless*
7.2d	AT_WK_AP	ATBE	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *appealing - unappealing*
7.2e	AT_WK_US	ATBI	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *useful - useless*
8a	ATT_IMPP	SN	Most people who are important to me think I should attend a workshop on agricultural education within the next year. *completely agree - completely disagree*
8b	ATT_PRIN	SN	My principal expects me to attend a Florida agriculture in the Classroom workshop within the next year. *completely agree - completely disagree*
8c	ATT_CURC	SN	My curriculum coordinators think I should attend a workshop within the next year on new agriscience concepts to use in my classroom. *completely agree - completely disagree*

Table C1. Continued

Item #	Variable Name	TPB Construct	Item
8d	ATT_STP	SN	My students' parents think I should attend an agricultural education workshop within the next year. *completely agree - completely disagree*
8e	ATT_EXP	SN	It is expected of me that I attend an agricultural education workshop within the next year. *completely agree - completely disagree*
9a	BEH_OTH	MC	Generally speaking, I want to do what other important people think I should do. *completely agree - completely disagree*
9b	BEH_PRIN	MC	Generally speaking, I want to do what my principal thinks I should do. *completely agree - completely disagree*
9c	BEH_CURC	MC	Generally speaking, I want to do what my curriculum coordinator thinks I should do. *completely agree - completely disagree*
9d	BEH_STP	MC	Generally speaking, I want to do what my students' parents think I should do. *completely agree - completely disagree*
9e	BEH_OTHT	MC	Generally speaking, I want to do what my fellow teachers think I should do. *completely agree - completely disagree*
10a	CTRLWKSP	PBC	I have control over whether I attend an agricultural education workshop within the next year. *definitely true- definitely untrue*
10b	CLDWKSP	PBC	If I wanted to, I could attend an agricultural education workshop within the next year. *definitely true- definitely untrue*
10c	UP2ME_WK	PBC	It is up to me whether I attend an agricultural education workshop within the next year. *definitely true - definitely untrue*
10d	CLD_T_AG	PBC	If I wanted to, I could teach about topics related to agriculture. *completely agree - completely disagree*
10e	UP2ME_HO	PBC	I decide when to use hands-on teaching methods. *definitely true - definitely untrue*
10f	UP2ME_SC	Ctrl	If I wanted to, it would be easy for me to include some science content in my teaching. *completely agree - completely disagree*

Table C1. Continued

Item #	Variable Name	TPB Construct	Item
10g	AT_WK_LK	BI	For me to attend an agricultural education workshop within the next year is: *extremely likely - extremely unlikely*
10h	AT_WKEAS	Ctrl	If I wanted to, it would be easy for me to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*
10i	CC_AT_WK	Ctrl	I feel in complete control over whether I attend an agricultural education workshop within the next year. *definitely true - definitely untrue*
11a	FCAT_EV	PBC	Supporting higher FCAT scores is *extremely good - extremely bad*
11b	FCAT_APR	PBC	Only FCAT curriculum materials are appropriate for the subject that I teach. *definitely true - definitely untrue*
11c	NFCAT_LK	PBC	Spending my time on content not included on the FCAT is *extremely likely - extremely unlikely*
11h	SPAG_LK	BBM	What is the likelihood that you would use Space Agriculture in the Classroom materials? *very likely - very unlikely*
12a	TRY_ATWK	BI	I will try to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*
12b	INT_ATWK	BI	I intend to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*
12c	AGWK_CNF	BI	I would attend an agricultural education workshop within the next year so that I can feel confident about teaching new information. *extremely likely - extremely unlikely*
12d	AGWK_CSH	EconMC	I would attend an agricultural education workshop within the next year if I received a stipend. *extremely likely - extremely unlikely*

APPENDIX D
CORRESPONDENCE

1. TITLE OF PROTOCOL:

Adoption of Agriscience Curriculum: The Role of Teachers' Awareness, Attitudes and Perceptions Leading to Agricultural Literacy in Mainstream Educational Settings

2. PRINCIPAL INVESTIGATOR(s): (Name, degree, title, dept., address, phone #, e-mail & fax)

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Doctoral Student
email — cmalecki@ufl.edu

3. SUPERVISOR (IF PI IS STUDENT): (Name, campus address, phone #, e-mail & fax)

Dr. Glenn Israel, Professor
Institute of Food and Agricultural Sciences
Department of Agricultural Education and Communication
407 Rolfs Hall
PO Box 110540
Gainesville, FL 32611 -0540
Phone- (352) 392-0502 ext. 246
Fax — (352) 392-9585
email — gdi@mail.ifas.ufl.edu

4. DATES OF PROPOSED PROTOCOL: From February 21, 2002 to December 20, 2002

5. SOURCE OF FUNDING FOR THE PROTOCOL:

(As indicated to the Office of Research, Technology and Graduate Education)

None

6. SCIENTIFIC PURPOSE OF THE INVESTIGATION:

Despite a statewide effort in Florida that mirrors efforts nationwide, relatively few Florida teachers have taken advantage of programs to enhance their ag literacy. During the last year there have been many missed opportunities by teachers to participate in workshops sponsored by Florida Agriculture in the Classroom, Inc. (FAITC). A disproportionate number of the participants are located in rural areas. Consequently, it is not yet evident whether students from urban and rural areas can be equally interested in agriculture. Little is known, moreover, about the awareness, attitudes and perceptions of teachers with respect to agricultural education. These are important factors because of the potential benefits for reaching those teachers who have ignored or omitted teaching opportunities related to agricultural education. Ultimately, failure to reach urban and suburban teachers means program failure (Rossi, Freeman and Lipsey, 1999). Thus, variable participation of equally recruited teachers becomes the critical issue.

The purpose of this study is to determine how attitudes, perceptions, and prior knowledge affect the likelihood of teacher participation in ag education workshops. A mail survey of approximately 1,000 Florida teachers at levels K-12 will be used to collect data for the study. The study will compare teachers who have attended one or more FAITC workshop with teachers who have chosen not to do so.

7. DESCRIBE THE RESEARCH METHODOLOGY IN NON-TECHNICAL LANGUAGE. The UFIRB needs to know what will be done with or to the research participant(s).

Teachers who attended Florida Agriculture in the Classroom State Teacher Workshops in 1998, 1999, 2000, 2001,and 2002 were recruited through mail flyers to receive training along with educational materials to implement in their classrooms. These teachers, about 500, will be contacted for mail survey data collection. Approximately 500 other teachers were recruited in the same manner and did not choose to attend the educational sessions. Those teachers will be surveyed about their reasons for not participating. Their names or identities will not be revealed. Standard mail survey procedures will be used. This includes sending a pre-letter to notify potential respondents about the survey, a questionnaire with a cover letter, a reminder post card and follow-up mailings to gain a high response rate. The pre-letter and cover letters will contain information detailing the informed consent process. If a person indicates that her or she does not wish to participate in the study, all efforts to contact the respondent will be stopped. The survey data will be entered into computer files and analyzed using statistical software packages.

8. POTENTIAL BENEFITS AND ANTICIPATED RISK. (If risk of physical, psychological or economic harm may be involved, describe the steps taken to protect participant.)

Potential benefits include improvement of the Florida Agriculture in the Classroom program coordinators to better recruit educators who will implement educational materials related to all agricultural topics. Also, to facilitate teacher understanding of how the curricula meet state teaching mandates. No more than minimal risk is expected.

9. DESCRIBE HOW PARTICIPANT(S) WILL BE RECRUITED, THE NUMBER AND AGE OF THE PARTICIPANTS, AND PROPOSED COMPENSATION (if any):

Per the methodology section, participants will be selected based on whether they have or have not attended workshop sessions about Florida Agriculture in The Classroom, Inc., (FAITC). Each sample will be randomly selected from the database of names of those invited and from those who attended. There will be no compensation for their time.

10. DESCRIBE THE INFORMED CONSENT PROCESS. INCLUDE A COPY OF THE INFORMED CONSENT DOCUMENT (if applicable).

Each mail survey will include a cover letter to explain the participant's selection and to obtain informed consent (See attachment A). Participation is voluntary and participants may decline to answer any questions or may withdraw at any time without penalty. Since potential participants will receive the questionnaire by mail and return the survey by mail, the receipt of a completed survey clearly indicates consent to participate in the study.

Please use attachments sparingly.

____
Principal Investigator's Signature

____
Supervisor's Signature

(Attachment A)

Dear Educator,

In recent years, Florida Agriculture in the Classroom, Inc., has prepared and distributed educational materials for teachers through summer workshops. Teachers throughout Florida have had the opportunity to attend or not attend these sessions. We are conducting a survey to find out about the factors that influenced teacher attendance at the workshops about Florida agriculture. Your answers will be used to improve our educational programs to make it easier for teachers to attend, use and understand the classroom materials.

You are one of a small number of teacher participants selected to participate in this study. Your participation is voluntary and we sincerely hope that you will help us with this project. You do not have to answer any question that you do not wish to answer. We believe that there are no risks to you from participating in this study. If you have questions about your rights concerning this study, please contact the UFIRB office, Box 112250, University of Florida, Gainesville, Florida 32611-2250. Your responses are valuable to us in order to proceed with additional parts of this study and we urge you to complete the questionnaire and return it as soon as possible. This is a good opportunity for you to help shape the programs developed for your benefit by the University of Florida and Florida Agriculture in the Classroom.

All answers to the completed questionnaires will be grouped together when the results are presented to the Florida Agriculture in the Classroom's Board of Directors and to IFAS research faculty. Please note that the identification number on the questionnaire will be used only to check your name off the mailing list when your questionnaire is returned. Please be assured that we will not release information that could identify individuals who participate in the study.

If you have any questions about this research study or the survey, please contact me by telephone (352-392-0502) or email (cmalecki@ufl.edu). We have provided a postage paid envelop for your convenience, so please put your completed questionnaire in the enclosed envelop and mail it to us.

Thank you for your help.

Sincerely,

Cynthia L. Malecki
UF Graduate Student and Project Director

(Attachment B) Pre-card

Dear __________(Participant's name),

The University of Florida and Florida Agriculture in the Classroom, Inc., non-profit researcher groups have worked to prepare high-quality educational materials for teachers to integrate into their curriculums. Accurate information about the current interest in agricultural literacy is very important to this effort. You are one of a small group of Florida educators selected to help provide this very important information.

You will receive a questionnaire in the mail in about three days. Please take a few minutes to complete the questionnaire as soon as it arrives, and return it to us in its postage-paid envelope provided for your convenience. Your information will be very valuable in helping shape the programs developed for your benefit by the University of Florida and Florida Agriculture in the Classroom.

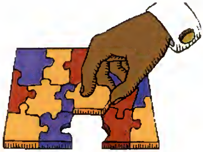
Sincerely,

Cindy Malecki
Graduate Research Assistant and Project Director

(Attachment C) Reminder post card

Yep, it's us again! We noticed that you're survey is a missing piece in our jigsaw puzzle!
If you have lost or misplaced the questionnaire that we sent you and would like another one, call me at 352-392-0502 x 223. Your part in the puzzle, the response to the survey, is very important to us.

If your questionnaire is already in the mail, THANK YOU VERY MUCH!



Sincerely,

Cindy Malecki
Graduate Research Assistant and Project Director

(Attachment D)
Non-FAITC participants

Dear Educator name (personalized)

The University of Florida and Florida Agriculture in the Classroom, Inc., non-profit researcher groups have worked to prepare high-quality educational materials for teachers to integrate into their curriculums. Accurate information about the current interest in agricultural literacy is very important to this effort. You are one of a small group of Florida educators have been selected to help provide very important information on ways to improve our programs, materials, and teacher recruitment.

Please take a few minutes to complete and return the enclosed questionnaire as soon as possible. We realize that your time is very precious and hope that the new materials you help us create by this next school year, free of charge for all of Florida's teachers, will also be of benefit to you.

You may be assured of confidentiality. The number of you questionnaire will only be used to let us know you have completed and returned your questionnaire. At no time will information from the surveys be identified by name. We have provided a postage-paid envelope for your use.

If you have any questions about this survey, please call me at (352) 392-0502 x 223. Questions or concerns about research participant's rights may also be directed to the UFIRB office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

Thank you again for your help.

Sincerely,

Cynthia L. Malecki
UF Graduate Researcher and Project Director

(Attachment E)
Cover letter for FAITC participants

February 2002

Dear Educator name (personalized)

The University of Florida and Florida Agriculture in the Classroom, Inc., non-profit researcher groups have worked to prepare high-quality educational materials for teachers to integrate into their curriculums. Accurate information about the current interest in agricultural literacy is very important to this effort. You are one of a small group of Florida educators who have attended our workshops, and received these materials to use in your professional settings. You have been selected to help provide very important information on ways to improve our programs, materials, and teacher recruitment.

Please take a few minutes to complete and return the enclosed questionnaire as soon as possible. We realize that your time is very precious and hope that the new materials you help us create by this next school year, free of charge for all of Florida's teachers, will also be of additional benefit to you.

You may be assured of confidentiality. The number of you questionnaire will only be used to let us know you have completed and returned your questionnaire. At no time will information from the surveys be identified by name. We have provided a postage-paid envelope for your use.

If you have any questions about this survey, please call me at (352) 392-0502 x 223. Questions or concerns about research participant's rights may also be directed to the UFIRB office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

Thank you again for your help.

Sincerely,

Cynthia L. Malecki
UF Graduate Researcher and Project Director

Dear Educator,

The University of Florida and Florida Agriculture in the Classroom, Inc., non-profit researcher groups have worked to prepare high-quality educational materials for teachers to integrate into their curriculums. Accurate information about the current interest in agricultural literacy is very important to this effort. You are one of a small group of Florida educators who have been selected to help provide very important information on ways to improve our programs, materials, and teacher recruitment.

Please take a few minutes to complete and return the enclosed questionnaire as soon as possible. We realize that your time is very precious and hope that the new materials you help us create by this next school year, free of charge for all of Florida's teachers, will also be of benefit to you.

You are one of a small number of teacher participants selected to participate in this study. Your participation is voluntary and we sincerely hope that you will help us with this project. You do not have to answer any question that you do not wish to answer. We believe that there are no risks to you from participating in this study. If you have questions about your rights concerning this study, please contact the UFIRB office, Box 112250, University of Florida, Gainesville, Florida 32611-2250. Your responses are valuable to us in order to proceed with additional parts of this study and we urge you to complete the questionnaire and return it as soon as possible. This is a good opportunity for you to help shape the programs developed for your benefit by the University of Florida and Florida Agriculture in the Classroom.

All answers to the completed questionnaires will be grouped together when the results are presented to the Florida Agriculture in the Classroom's Board of Directors and to IFAS research faculty. Please note that the identification number on the questionnaire will be used only to check your name off the mailing list when your questionnaire is returned. Please be assured that we will not release information that could identify individuals who participate in the study.

If you have any questions about this research study or the survey, please contact me by email (cmalecki@ufl.edu) or call me at 614-985-6858. We have provided a postage paid envelop for your convenience, so please put your completed questionnaire in the enclosed envelop and mail it to us. Thank you for your help.

Sincerely,

Cynthia L. Malecki
UF Graduate Student and Project Director

Glenn D. Israel
Professor

APPENDIX E
CORRELATIONS AMONG DEMOGRAPHIC VARIABLES

Table E1 Correlations among Demographic Variables: Nonparticipants (below the diagonal) and Participants (above the diagonal)

	Yrs T	Yrs T in FL	Farm or Ranch	Gr K-2	Gr 3-5	Gr 6-8	Gr 9-12	Annual # of Workshops
Number of years teaching	--	.817**	.274**	.138	.088	.080	-.080	.088
Number of years teaching in Florida	.876**	--	.199+	.032	.014	.166	-.042	.195+
Raised on a farm or ranch	-.006	-.049	--	.095	.005	.118	.099	.144
Grades K-2	.065	.08.	-.082	--	.072	-.177	-.107	.083
Grades 3-5	-.093	-.177*	.182*	-.178*	--	-.406**	-.208*	.190+
Grades 6-8	-.120	-.063	-.029	-.390**	-.287**	--	.101	-.218*
Grades 9-12	.186*	.146	-.041	-.416**	-.349**	-.127	--	-.087
Annual number of workshops attended	-.133-	-.126	.085	-.069	.244**	-.066	-.066	--
Pursuing advanced degree	-.289**	-.266**	.134	-.133	.025	.152+	.020	.208*
Work with interns	.079	.094	-.009	.064	.028	-.042	-.082	.366**
Hours planning per week	-.053	-.136	.128	-.046	.143	-.007	-.085	.244**
Teach in urban area	.037	.070	-.073	-.110	.126	-.074	.099	-.077
Teach in suburban area	-.049	-.046	-.030	.055	-.051	.046	-.111	.033

Table E1. Continued

	Yrs T	Yrs T in FL	Farm or Ranch	Gr K-2	Gr 3-5	Gr 6-8	Gr 9-12	Annual # of Workshops
Teach in rural area	.020	-.036	.160+	.084	-.115	.042	.022	.067
Percent free or reduced lunch	-.190*	-.173+	.031	-.121	.251**	.081	-.226*	.002
Former 4H and/or FFA	.244**	.128	.147+	.065	-.023	.085	-.046	.022

	Pursuing adv. degree	Work with interns	Hours planning per week	Teach in urban area	Teach in suburban area	Teach in rural area	% free/ reduced lunch	Former 4-H/FFA
Number of years teaching	-.217*	.156	-.051	-.069	.152	-.066	-.137	.035
Number of years teaching in Florida	-.128	.246*	.025	.016	-.023	.042	-.034	.063
Raised on a farm or ranch	-.023	-.168	-.019	-.218*	.050	.120	.113	.165
Grades K-2	-.039	-.019	-.178+	.213*	-.135	-.007	.197+	-.027
Grades 3-5	-.168	.218*	-.072	-.138	-.097	.175+	.089	-.100
Grades 6-8	.147	-.071	-.001	.054	.077	-.101	-.153	-.046
Grades 9-12	.231*	-.145	.073	-.001	-.137	.145	.002	.005
Annual number of workshops attended	.034	.338**	-.168	.022	.141	-.156	.057	-.130

Table E1. Continued

	Pursuing adv. degree	Work with interns	Hours planning per week	Teach in urban area	Teach in suburban area	Teach in rural area	% free/ reduced lunch	Former 4-H/FFA
Pursuing advanced degree	--	-.038	.275**	-.106	-.085	.169+	.037	.141
Work with interns	.169+	--	-.054	-.069	-.004	.071	-.048	.056
Hours planning per week	.091	.101	--	-.229*	-.041	.223	.168	.147
Teach in urban area	-.024	.029	-.116	--	-.351**	-.374**	.104	-.096
Teach in suburban area	.008	-.036	.057	-.797**	--	-.717**	-.341**	.024
Teach in rural area	.024	.012	.090	-.299**	-.338**	--	.293**	.060
Percent free or reduced lunch	.090	-.066	-.148	.353**	-.448**	.147	--	.000
Former 4H and/or FFA	-.048	-.054	.129	-.311**	.112	.307**	-.016	--

APPENDIX F
PRINCIPAL COMPONENTS ANALYSIS

Table F1 Loadings on First Principal Component for Survey Items, by Theory of Planned Behavior (TPB) Construct

				Loadings on First Principal Component	
TPB Construct	Item Number	Variable Name	Item	Participants	Nonparticipants
BBM	1a	TEACH_AE	In my teaching I cover agricultural education. *extremely likely - extremely unlikely*	.787	.788
BBM	1b	PREP_AGC	I am preparing students for agricultural careers. *completely agree - completely disagree*	.738	.735
BBM	1c	PREP_BIO	I am preparing students for biological, environmental, and science careers. *extremely likely - extremely unlikely*	.688	.694
BBM	1d	AITC_INT	The Florida Agriculture in the Classroom topics may interest my students. *extremely likely - extremely unlikely*	.794	.832
BBM	2d	MYTAE_LK	My teaching agricultural education concepts is: *extremely likely - extremely unlikely*	.831	.794
BBM	3d	PRAGC_LK	Preparing my students for agricultural careers is: *extremely likely - extremely likely*	.765	.735
BBM	11h	SPAG_LK	What is the likelihood that you would use Space Agriculture in the Classroom materials? *very likely - very unlikely*	.662	.613

Table F1. Continued

TPB Construct	Item Number	Variable Name	Item	Loadings on First Principal Component Parti-cipants	 Nonpar-ticipants
ATBI	2e	MYTAE_BN	My teaching agricultural education concepts is: *extremely beneficial - extremely harmful*	.556	.686
ATBI	6e	C_AGS_BN	To be confident about agriscience topics is: *extremely beneficial - extremely harmful*	.579	.711
ATBI	7.1d	T_AG_AP	I think teaching about agriculture is: *appealing - unappealing*	.797	.740
ATBI	7.2c	AT_WK_VA	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *valuable - worthless*	.908	.899
ATBI	7.2e	AT_WK_US	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *useful - useless*	.898	.883
ATBE	2b	MYTAE_US	My teaching agricultural education concepts is: *extremely useful - extremely useless*	.418	.428
ATBE	6b	C_AGS_DE	To be confident about agriscience topics is: *extremely desirable - extremely undesirable*	.526	.672
ATBE	7.1b	T_AG_DE	I think teaching about agriculture is: *desirable - undesirable*	.878	.855
ATBE	7.1c	T_AG_VA	I think teaching about agriculture is: *valuable - worthless*	.939	.905

Table F1. Continued

				Loadings on First Principal Component	
TPB Construct	Item Number	Variable Name	Item	Participants	Nonparticipants
ATBE	7.1e	T_AG_US	I think teaching about agriculture is: *useful - useless*	.900	.920
ATBE	7.2d	AT_WK_AP	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *appealing - unappealing*	.822	.642
SN	8a	ATT_IMPP	Most people who are important to me think I should attend a workshop on agricultural education within the next year. *completely agree - completely disagree*	.798	.831
SN	8b	ATT_PRIN	My principal expects me to attend a Florida agriculture in the Classroom workshop within the next year. *completely agree - completely disagree*	.921	.949
SN	8c	ATT_CURC	My curriculum coordinators think I should attend a workshop within the next year on new agriscience concepts to use in my classroom. *completely agree - completely disagree*	.949	.954
SN	8d	ATT_STP	My students' parents think I should attend an agricultural education workshop within the next year. *completely agree - completely disagree*	.913	.960

Table F1. Continued

				Loadings on First Principal Component	
TPB Construct	Item Number	Variable Name	Item	Participants	Nonparticipants
SN	8e	ATT_EXP	It is expected of me that I attend an agricultural education workshop within the next year. *completely agree - completely disagree*	.889	.908
MC	9a	BEH_OTH	Generally speaking, I want to do what other important people think I should do. *completely agree - completely disagree*	.843	.828
MC	9b	BEH_PRIN	Generally speaking, I want to do what my principal thinks I should do. *completely agree - completely disagree*	.877	.868
MC	9c	BEH_CURC	Generally speaking, I want to do what my curriculum coordinator thinks I should do. *completely agree - completely disagree*	.839	.894
MC	9d	BEH_STP	Generally speaking, I want to do what my students' parents think I should do. *completely agree - completely disagree*	.824	.771
MC	9e	BEH_OTHT	Generally speaking, I want to do what my fellow teachers think I should do. *completely agree - completely disagree*	.852	.848

Table F1. Continued

				Loadings on First Principal Component	
TPB Construct	Item Number	Variable Name	Item	Participants	Nonparticipants
BI	10g	AT_WK_LK	For me to attend an agricultural education workshop within the next year is: *extremely likely - extremely unlikely*	.899	.840
BI	12a	TRY_ATWK	I will try to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.963	.962
BI	12b	INT_ATWK	I intend to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.967	.960
BI	12c	AGWK_CNF	I would attend an agricultural education workshop within the next year so that I can feel confident about teaching new information. *extremely likely - extremely unlikely*	.957	.918
Ctrl	10f	UP2ME_SC	If I wanted to, it would be easy for me to include some science content in my teaching. *completely agree - completely disagree*	.468	.613
Ctrl	10h	AT_WKEAS	If I wanted to, it would be easy for me to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.865	.878

Table F1. Continued

TPB Construct	Item Number	Variable Name	Item	Loadings on First Principal Component Parti-cipants	 Nonpar-ticipants
Ctrl	10i	CC_AT_WK	I feel in complete control over whether I attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.811	.750
PBC	10a	CTRLWKSP	I have control over whether I attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.885	.871
PBC	10b	CLDWKSP	If I wanted to, I could attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.914	.901
PBC	10c	UP2ME_WK	It is up to me whether I attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.906	.924
PBC	10d	CLD_T_AG	If I wanted to, I could teach about topics related to agriculture. *completely agree - completely disagree*	.503	.464
OEM	5a	HANDS_EV	Using hands-on classroom activities for learning is: *extremely good - extremely bad*	.071	.543

Table F1. Continued

				Loadings on First Principal Component	
TPB Construct	Item Number	Variable Name	Item	Participants	Nonparticipants
OEM	7.1a	T_AG_EV	I think teaching about agriculture is: *good - bad*	.813	.725
OEM	7.2a	AT_WK_EV	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *good - bad*	.957	.931
OEM	7.2b	AT_WK_DE	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *desirable - undesirable*	.957	.925

Note: Economic Motivation to Comply (EconMC) was measured by only one survey item. Therefore, this construct is not included in the table.

Table F2 Principal Component Communalities for Survey Items, by Theory of Planned Behavior (TPB) Construct

TPB Construct	Item #	Variable Name	Item	Communalities Participants	Communalities Nonparticipants
BBM	1a	TEACH_AE	In my teaching I cover agricultural education. *extremely likely - extremely unlikely*	.619	.622
BBM	1b	PREP_AGC	I am preparing students for agricultural careers. *completely agree - completely disagree*	.545	.540
BBM	1c	PREP_BIO	I am preparing students for biological, environmental, and science careers. *extremely likely - extremely unlikely*	.474	.481
BBM	1d	AITC_INT	The Florida Agriculture in the Classroom topics may interest my students. *extremely likely - extremely unlikely*	.630	.693
BBM	2d	MYTAE_LK	My teaching agricultural education concepts is: *extremely likely - extremely unlikely*	.691	.630
BBM	3d	PRAGC_LK	Preparing my students for agricultural careers is: *extremely likely - extremely likely*	.586	.541
BBM	11h	SPAG_LK	What is the likelihood that you would use Space Agriculture in the Classroom materials? *very likely - very unlikely*	.438	.376

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Parti-cipants	Nonpar-ticipants
ATBI	2e	MYTAE_BN	My teaching agricultural education concepts is: *extremely beneficial - extremely harmful*	.309	.470
ATBI	6e	C_AGS_BN	To be confident about agriscience topics is: *extremely beneficial - extremely harmful*	.335	.505
ATBI	7.1d	T_AG_AP	I think teaching about agriculture is: *appealing - unappealing*	.636	.547
ATBI	7.2c	AT_WK_VA	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *valuable - worthless*	.825	.809
ATBI	7.2e	AT_WK_US	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *useful - useless*	.806	.780
ATBE	2b	MYTAE_US	My teaching agricultural education concepts is: *extremely useful - extremely useless*	.174	.183
ATBE	6b	C_AGS_DE	To be confident about agriscience topics is: *extremely desirable - extremely undesirable*	.277	.451
ATBE	7.1b	T_AG_DE	I think teaching about agriculture is: *desirable - undesirable*	.772	.731
ATBE	7.1c	T_AG_VA	I think teaching about agriculture is: *valuable - worthless*	.882	.819

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Participants	Nonparticipants
ATBE	7.1e	T_AG_US	I think teaching about agriculture is: *useful - useless*	.810	.847
ATBE	7.2d	AT_WK_AP	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *appealing - unappealing*	.675	.413
SN	8a	ATT_IMPP	Most people who are important to me think I should attend a workshop on agricultural education within the next year. *completely agree - completely disagree*	.691	.637
SN	8b	ATT_PRIN	My principal expects me to attend a Florida agriculture in the Classroom workshop within the next year. *completely agree - completely disagree*	.901	.848
SN	8c	ATT_CURC	My curriculum coordinators think I should attend a workshop within the next year on new agriscience concepts to use in my classroom. *completely agree - completely disagree*	.910	.901
SN	8d	ATT_STP	My students' parents think I should attend an agricultural education workshop within the next year. *completely agree - completely disagree*	.922	.834

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Participants	 Nonparticipants
SN	8e	ATT_EXP	It is expected of me that I attend an agricultural education workshop within the next year. *completely agree - completely disagree*	.824	.790
MC	9a	BEH_OTH	Generally speaking, I want to do what other important people think I should do. *completely agree - completely disagree*	.686	.710
MC	9b	BEH_PRIN	Generally speaking, I want to do what my principal thinks I should do. *completely agree - completely disagree*	.753	.770
MC	9c	BEH_CURC	Generally speaking, I want to do what my curriculum coordinator thinks I should do. *completely agree - completely disagree*	.798	.703
MC	9d	BEH_STP	Generally speaking, I want to do what my students' parents think I should do. *completely agree - completely disagree*	.595	.679
MC	9e	BEH_OTHT	Generally speaking, I want to do what my fellow teachers think I should do. *completely agree - completely disagree*	.719	.726
BI	10g	AT_WK_LK	For me to attend an agricultural education workshop within the next year is: *extremely likely - extremely unlikely*	.705	.807

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Participants	 Nonparticipants
BI	12a	TRY_ATWK	I will try to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.925	.927
BI	12b	INT_ATWK	I intend to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.922	.935
BI	12c	AGWK_CNF	I would attend an agricultural education workshop within the next year so that I can feel confident about teaching new information. *extremely likely - extremely unlikely*	.844	.915
Ctrl	10f	UP2ME_SC	If I wanted to, it would be easy for me to include some science content in my teaching. *completely agree - completely disagree*	.376	.219
Ctrl	10h	AT_WKEAS	If I wanted to, it would be easy for me to attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.771	.748
Ctrl	10i	CC_AT_WK	I feel in complete control over whether I attend an agricultural education workshop within the next year. *definitely true - definitely untrue*	.562	.657

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Parti- cipants	 Nonpar- ticipants
PBC	10a	CTRLWKSP	I have control over whether I attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.783	.759
PBC	10b	CLDWKSP	If I wanted to, I could attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.836	.811
PBC	10c	UP2ME_WK	It is up to me whether I attend an agricultural education workshop within the next year. *definitely true- definitely untrue*	.821	.853
PBC	10d	CLD_T_AG	If I wanted to, I could teach about topics related to agriculture. *completely agree - completely disagree*	.253	.215
OEM	5a	HANDS_EV	Using hands-on classroom activities for learning is: *extremely good - extremely bad*	.005	.295
OEM	7.1a	T_AG_EV	I think teaching about agriculture is: *good - bad*	.661	.526
OEM	7.2a	AT_WK_EV	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *good - bad*	.916	.868

Table F2. Continued

TPB Construct	Item #	Variable Name	Item	Communalities Parti-cipants	 Nonpar-ticipants
OEM	7.2b	AT_WK_DE	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *desirable - undesirable*	.916	.855

Note: Economic Motivation to Comply (EconMC) was measured by only one survey item. Therefore, this construct is not included in the table.

Table F3 Survey Items Deleted in Principal Components Analysis, by Theory of Planned Behavior (TPB) Construct

TPB Construct	Item #	Variable Name	Item
BBM	1e	HANDS_NC	Hands-on classroom activities are necessary for learning. *completely agree - completely disagree*
BBM	6d	C_AGS_LK	To be confident about agriscience topics is: *extremely likely - extremely unlikely*
BBM	11h	SPAG_LK	What is the likelihood that you would use Space Agriculture in the Classroom materials? *very likely - very unlikely*
ATBI	3e	PRAGC_BN	Preparing my students for agricultural careers is: *extremely beneficial - extremely harmful*
ATBI	4e	PRBIO_BE	Preparing students for biological, environmental, and science careers is: *extremely beneficial - extremely harmful*
ATBI	6c	C_AGS_AP	To be confident about agriscience topics is: *extremely appealing - extremely unappealing*
ATBI	7.2b	AT_WK_DE	My attitude towards attending a Florida Agriculture in the Classroom workshop is: *desirable - undesirable*
ATBE	2c	MYTAE_AP	My teaching agricultural education concepts is: *extremely appealing - extremely unappealing*
ATBE	3b	PRAGC_DE	Preparing my students for agricultural careers is: *extremely desirable - extremely undesirable*
ATBE	3c	PRAGC_VA	Preparing my students for agricultural careers is: *extremely valuable - extremely worthless*
ATBE	4b	PRBIO_DE	Preparing students for biological, environmental, and science careers is: *extremely desirable - extremely undesirable*

Table F3. Continued

TPB Construct	Item #	Variable Name	Item
ATBE	4c	PRBIO_US	Preparing students for biological, environmental, and science careers is: *extremely useful - extremely useless*
ATBE	4d	PRBIO_AP	Preparing students for biological, environmental, and science careers is: *extremely appealing - extremely unappealing*
ATBE	5b	HANDS_DE	Using hands-on classroom activities for learning is: *extremely desirable - extremely undesirable*
ATBE	5c	HANDS_UE	Using hands-on classroom activities for learning is: *extremely useful - extremely useless*
ATBE	5d	HANDS_AP	Using hands-on classroom activities for learning is: *extremely appealing - extremely unappealing*
PBC	10e	UP2ME_HO	I decide when to use hands-on teaching methods. *definitely true - definitely untrue*
PBC	11a	FCAT_EV	Supporting higher FCAT scores is *extremely good - extremely bad*
PBC	11b	FCAT_APR	Only FCAT curriculum materials are appropriate for the subject that I teach. *definitely true - definitely untrue*
PBC	11c	NFCAT_LK	Spending my time on content not included on the FCAT is *extremely likely - extremely unlikely*
OEM	2a	MYTAE_EV	My teaching agricultural education concepts is: *extremely good - extremely bad*
OEM	3a	PRAGC_EV	Preparing my students for agricultural careers is: *extremely good - extremely bad*

Table F3. Continued

TPB Construct	Item #	Variable Name	Item
OEM	4a	PRBIO_EV	Preparing students for biological, environmental, and science careers is: *extremely good - extremely bad*
OEM	5e	HANDS_WI	Using hands-on classroom activities for learning is: *extremely wise - extremely unwise*
OEM	6a	C_AGS_EV	To be confident about agriscience topics is: *extremely good - extremely bad*

Note: Five constructs are not included in this table. Economic Motivation to Comply (EconMotive) was measured by only one survey item and did not undergo principal components analysis. Four other constructs (SN, MC, BI, and Ctrl) remained intact with no items deleted in the principal components analysis.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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